Regency Land Mobile, Inc.

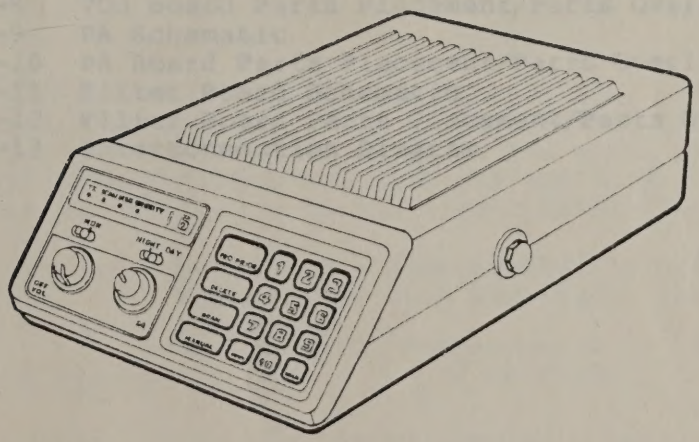
SERVICE MANUAL

VHF FM
MOBILE TRANSCEIVER

Regency® Product Group

Wilson Product Group

RH600 **WH6016**



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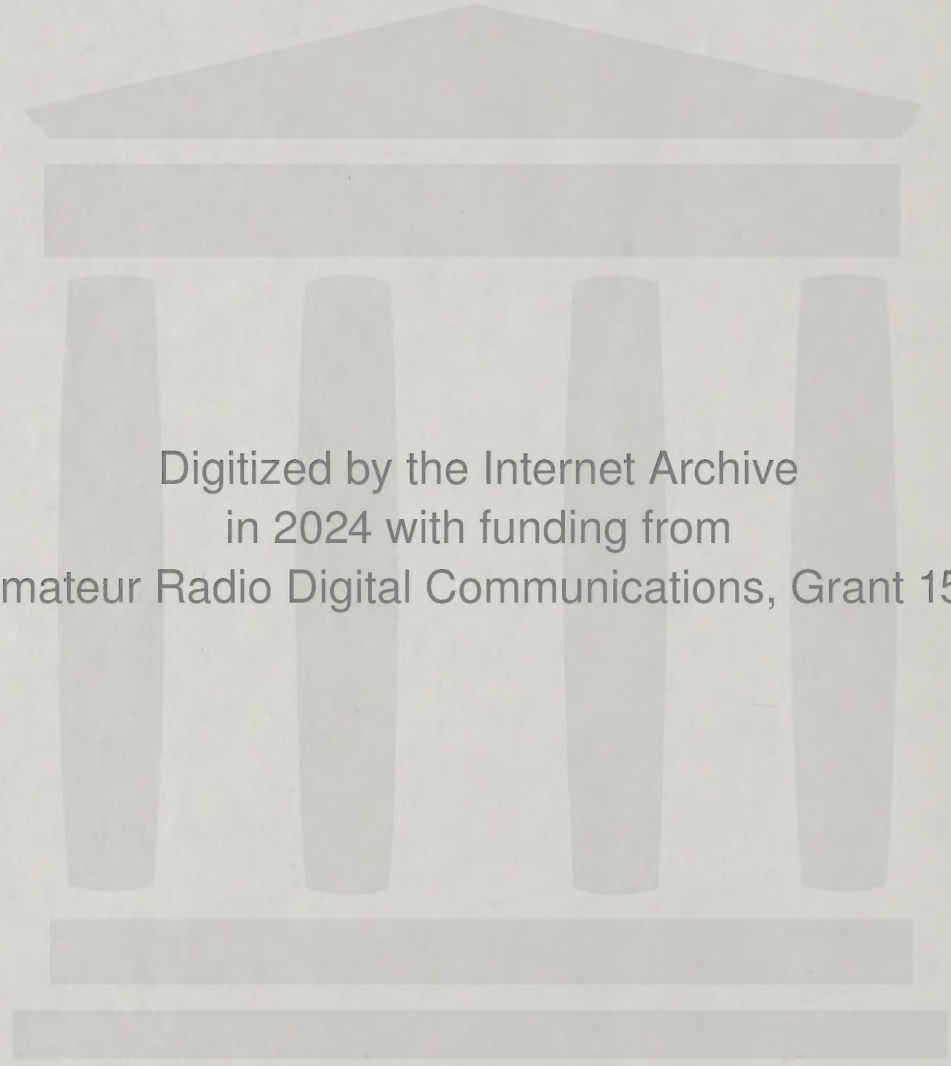


TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

S E C T I O N 1 - D E S C R I P T I O N

1-1 PRODUCT INTRODUCTION

The RH/WH series high power radios are available in either 10- or 16-channel versions and designed for use in the VHF Land Mobile Communications Band. A, B, and C models are available for each radio. The "A" model is designed for operation in the 134 to 150 MHz frequency band. The "B" model is designed for use in the 150 to 162 MHz frequency band. The "C" model operates in a 162 to 174 MHz frequency band. All radios are designed to work in systems requiring 30 kHz channel spacing.

These transceivers are programmable by the service technician. Thus, there is no need to order crystals or PROMs from the factory. Each radio comes equipped with an electrically alterable read-only memory (EAROM). This device stores the radio's characteristics as programmed via the radio's keyboard.

A CTCSS encoder and decoder is built in as standard equipment. Thirty-seven EIA tone frequencies are available for use on each channel and, on the 16-channel version only, a different tone frequency can be selected for encode and decode on the same channel. A mixing of tone and non-tone channels may be programmed into the radio along with encode only or decode only channels (the decode only channels require that the transmitter be disabled).

The radio is capable of being programmed for operation in simplex and/or half-duplex systems. Simplex and half-duplex channels may be programmed in one radio.

Active channel and priority channel scanning features are also standard equipment. These features are entirely user programmable from the front panel. The user, under normal operation, simply enters the channels that are to be scanned and selects the desired scan function from the keyboard.

The keyboard is used in radio programming and during normal operation. The keyboard is back lit when the day/night switch is in the night position.

1-2 SYSTEM CONSIDERATIONS

These radios have the flexibility to work in various systems. However, they are recommended for use in CTCSS, non-CTCSS, simplex, or half-duplex systems only.

While no internally installed option circuits have been tested with these units, contact the Customer Service Department for specific advice if such installations are desired.

Accessories and options available for these radios are:

		Wilson	Regency
1.	5-Watt Horn Speaker	MHS5	MA- 48
2.	Handset and Cradle	CH1	
3.	Hand Microphone	MHM2	MA- 83
4.	DC Power Cord, 15A		MA-168
5.	External Speaker	TMES	MA-108A
6.	Handset w/Switch	THH2	MA-126
7.	Mounting Bracket, Heavy Duty		MA-375
8.	12A Alternator Whine Filter		MA-365B
9.	Split Bar Desk Mic, w/Compr. Amp	SBM3	MA-370
10.	12A 13 VDC Power Supply (117 VAC)		P1412
11.	DC Power Cord for Power Supply		MA-322

Although the transceivers have been tested for performance with excessive AC ripple on the power supply lines, all situations can not be anticipated. There may be some installations that introduce far more ripple than the radio can handle. In these installations the Alternator Whine Filter was designed to cut out the ripple to the radio. Check with the installation section to review the proper installation practices.

1-3 SPECIFICATIONS

General

CHANNELS	1 - 10 dealer programmable or 1 - 16 dealer programmable
CHANNEL SPACING	30 kHz (5 kHz min resolution)
FREQUENCY RANGE	
BAND A	134 - 150 MHz
BAND B	150 - 162 MHz
BAND C	162 - 174 MHz
SIZE	6 1/2 x 3 1/4 x 11 1/4 inches 16.5 x 8.3 x 28.6 cm
WEIGHT	6 lbs., 2 ozs., 2.8 kg (mass)
OPERATING TEMPERATURE	-22° to 140°F, -30° to +60°C
STORAGE TEMPERATURE	-59°F to 194°F, -50°C to 90°C
OPERATING DUTY CYCLE	20%, 1 min. TX, 4 min. RX
ANTENNA IMPEDANCE	50 ohm
SUPPLY VOLTAGE	13.6 VDC ±15%
CURRENT DRAIN	
Receiver Squelched	500 mA Max*
Receiver Maximum Audio	1.1 A*
Transmitting	
(60W output)	12A
(Max. power out or wide freq. spread)	15A Max

*Add 150mA for operation below 0°C (32°F)

Receiver

RECEIVER SENSITIVITY	
12 dB SINAD	.35 uV (-116 dBm)
20 dB Quieting	.5 uV (-113 dBm)
SQUELCH SENSITIVITY	
Threshold Squelch	.2 uV (-121 dBm)
Tight Squelch	1 uV (-107 dBm)
CTCSS SENSITIVITY	.32 uV(-115.9dBm) w/tone dev. of 750 Hz
ADJ CHANNEL DESENS 12 dB	70 dB
OPERATING BANDWIDTH	3.0 MHz (1.5 MHz)
IMAGE REJECTION	70 dB
SPURIOUS REJECTION	85 dB
IM 12 dB SINAD	70 dB
MODULATION ACCEPTANCE BANDWIDTH	±7.5 KHz
FREQUENCY STAB/TEMP	±.0005%
FREQUENCY STAB/VOLT	±.0001%
AUDIO RESPONSE	per EIA RS204C, Part 9
AUDIO POWER OUT	5W @ 10% Dist
SQUELCH BLOCKING	per EIA RS204C, Part 18
RECEIVER ATTACK TIME	150 mS Max
RECEIVER SQUELCH CLOSING TIME (EIA)	250 mS Max
HUM & NOISE RATIO, UNSQUELCHED	45 dB Min
HUM & NOISE RATIO, SQUELCHED	60 dB Min
UNDESIRED RADIATED	Per FCC Part 15, Subpart C

1-3 SPECIFICATIONS (continued)

Transmitter

POWER OUTPUT	60W Min	
DC POWER INTO FINAL	150 Max	
OUTPUT FREQ STAB/TEMP	±.0005%	
OUTPUT FREQ STAB/VOLT	±.0001%	
SPURIOUS & HARMONICS, CONDUCTED	-62 dBc	
SPURIOUS & HARMONICS, RADIATED	Meets FCC requirements for Parts 2, 21, 90, and 95	
OPERATING BANDWIDTH	3 MHz (±1.5 MHz)	
EMISSION DESIGNATOR	16F3	
MODULATION	Factory set at FCC max of ±5 kHz	
AUDIO FREQ DISTORTION	3%	
F.M. HUM & NOISE	35 dB	
A.M. HUM & NOISE	Per EIA RS152B	Part 16
AUDIO FREQ RESPONSE	Per EIA RS152B	Part 7
TRANSMITTER ATTACK TIME	Per EIA RS152B	Part 18
SIDEBAND SPECTRUM	Per EIA RS152B	Part 17

NOTE: Specifications subject to change without notice.

1-4 EQUIPMENT SUPPLIED

1. Radio
2. Hand Microphone
3. Hardware Kit No. 2
4. Mounting Bracket
5. Two (2) Black Anti-Rotation Washers
6. Two (2) Steel Washers
7. Two (2) Lock Washers
8. Two (2) Mounting Bolts
9. DC Power Cord w/15A Fuse
10. External Speaker

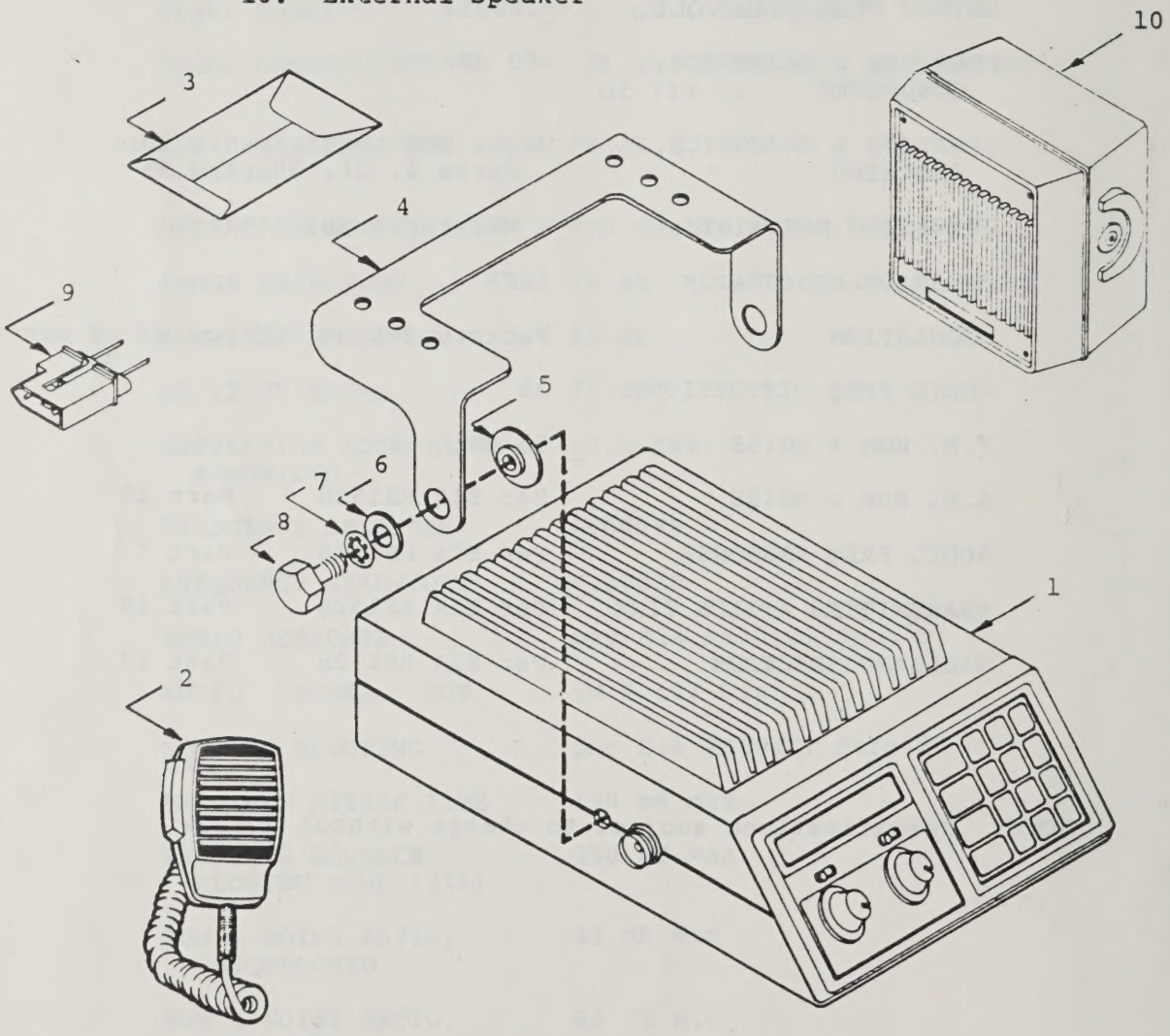


FIGURE 1 - EQUIPMENT SUPPLIED

1-5 EQUIPMENT NOT SUPPLIED

1. Antenna
2. Antenna Feed Cable
3. 13 V Supply

1-6 OPERATION

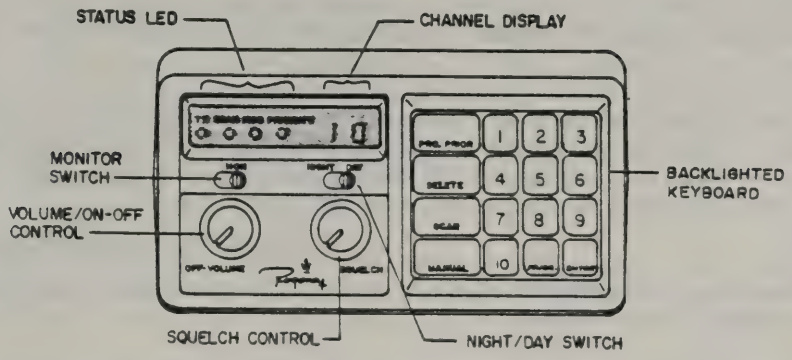


FIGURE 2

(Refer to Figure 2 for the following descriptions.)

VOLUME CONTROL/ON-OFF SWITCH

This control varies the speaker volume. Clockwise rotation turns the radio on and increases the volume. The 10-channel radio always returns to the programmed priority channel in MANUAL mode when it is turned on. The 16-channel radio, however, remembers the state it was in when it was turned off and returns to that same state when reactivated (i.e. same channel and/or scan or priority modes).

SQUELCH CONTROL

The squelch control is used to eliminate the speaker noise when not receiving a transmission. Move the control clockwise until noise is heard (if in the SCAN mode the receiver will stop scanning). Then move the control counterclockwise until the speaker noise is squelched (if in the SCAN mode the receiver will start to scan approximately two seconds after the speaker squelches).

MONITOR SWITCH

Placing this switch in the "MON" position allows the user to monitor the channel when the CTCSS decoder is operating.

NIGHT/DAY SWITCH

Placing this switch in the "DAY" position places the display lights at maximum luminosity and does not light the keyboard. In the "NIGHT" position the display lights' luminosity is decreased and the keyboard is illuminated.

STATUS LEDs

There are four status LEDs located to the left of the channel display.

TX - When lit indicates that the transmitter is activated. This is accomplished by removing the microphone from the hang-up clip (off-hook condition) and pressing the push-to-talk switch on the microphone.

SCAN - When lit indicates that the radio is in the SCAN mode. Pressing the SCAN button on the keyboard puts the radio in the SCAN mode.

MSG - When lit indicates that a message has been received. The radio's CTCSS decoder must be activated in order for this LED to function. If a message has been received, going off hook or changing the channel will reset the LED to its OFF state.

PRIOR - When lit indicates that the radio's priority function has been selected. Pressing the PRIOR button on the keypad will activate and deactivate the PRIORITY function.

CHANNEL DISPLAY

Displays the current channel the radio is operating on. The channels are selected by pressing the appropriate button(s) on the keyboard.

A. Receiver Operation

1. Receiver Operation - 10-Channel Models

There are two receiver operating modes, manual and scan. The radio powers-up in the manual mode on the priority channel.

Manual Mode:

The manual mode is entered by pressing the MANUAL button or any of the channel buttons (1-10) on the keyboard. The scan LED is extinguished. The radio operates on the displayed channel.

Scan Mode:

The scan mode allows the radio to monitor activity on more than one channel. Pressing the SCAN button on the keyboard will place the radio in the scan mode. The scan LED will be illuminated. The radio will scan the channels placed into the scan list only if the microphone is on-hook (mic hang-up button connected to chassis ground) and the squelch control adjusted to squelch the radio (without a carrier present). With the radio properly set up to scan, the scan LED will blink and the display will turn off while the radio scans. When there is activity on one of the channels in the scan list, the scan LED will be held on and the active channel will be displayed. The radio goes to the priority channel whenever the microphone is lifted off hook. When the microphone is placed back in the hang-up clip, the radio resumes scanning.

Programming the Scan List

Programming the scan list is a user operation. That is, the radio is not to be in the program mode for this operation.

Entering a channel into the scan list is accomplished by pressing the channel to be entered and the ENTER button on the keyboard. When the ENTER button is pressed, the display will momentarily blink off and then will display the channel just entered in the scan list.

To delete a channel from the scan list, press the channel to be deleted and then press the DELETE button on the keyboard. The channel display will blink off and after the channel has been deleted from the list, the next channel in the list will be displayed.

If deleting consecutive channels in the scan list, it is not necessary to enter all the channels. The channels can be deleted by pressing the first channel number of the sequence, then press the DELETE button as many times as there are channels to delete. For example, to delete channels 3, 4, and 5 in the scan list, select channel 3 and press the DELETE button three times.

When all the channels have been deleted from the scan list, a flashing "C" will be displayed. The scanner will not operate without any channels in the scan list.

To review the channels in the scan list, press the MANUAL button on the keyboard. Each time the MANUAL button is pressed the next higher channel in the scan list is displayed.

The Priority Function

The priority function allows the operator to listen to one channel (non-priority channel) and not miss an important message on another, more important, channel (priority channel). Pressing the PRIOR button on the keyboard will enable or disable the priority function. When the priority LED is lit, the priority function is enabled.

Whenever selecting the priority function (pressing the PRIOR button resulting in illumination of the priority LED) the radio will go into the manual mode and jump to the priority channel. When disabling the priority function (pressing the PRIOR button resulting with the priority LED turning off) the radio will stay in the mode in which it was operating.

To change the priority channel, select the channel to become the priority channel and press the PRO PRIOR and ENTER buttons on the keyboard (in that order).

Priority-Manual Operation

The squelch control must be set, squelching the radio, to allow the priority function to operate. When the radio is listening on a non-priority channel, the radio will look at the priority channel occasionally. If the priority channel is active, the radio will stop on that channel and monitor the transmission. The radio does this regardless of what is happening on the non-priority channel. When the priority channel becomes inactive and the microphone was not lifted from the hang-up clip, the radio will return to listen to the non-priority channel it was on before. But if the microphone is lifted, the radio will remain on the priority channel, forgetting the non-priority channel it was on previously.

Priority-Scan Operation

Operation of the radio with the priority function selected in the scan mode is similar to that of the non-priority scan mode with one exception. If the radio stops scanning ("locks up") on a non-priority channel, the radio will occasionally look at the priority channel. If there is activity on the priority channel, the radio will stay on the priority channel; if not, the radio will go back to the channel that was interrupted.

Lifting the microphone off-hook will cause the radio to stop scanning and go to the priority channel. Upon placing the microphone on-hook, the radio will resume scanning.

If a call comes in on a non-priority channel, however, and the microphone is lifted off-hook, causing the radio to jump to the priority channel, the message channel is lost. To prevent this from occurring, the user must note the channel the message was on and press the channel button on the keyboard (taking the radio out of the scan mode) and then pick up the microphone.

2. Receiver Operation - 16-Channel Models

The operation of this radio is similar to that of the 10-channel radio. There are two receiver modes, manual and scan. The 16-channel radio, however, powers up to the state the radio was in before the power was turned off. The radio even remembers the state it was in after the power has been removed.

Manual Mode:

The manual mode is the same as the 10-channel radio with the exception of selecting channels 11 through 16. Whenever the "1" button is pressed, the display will flash a "1" in the tens position. If a second number is not entered within three seconds, the radio will revert to channel 1. If, however, a second button between 1 and 6 is pressed, the radio will select that channel 11 through 16, respectively.

Scan Mode:

The scan mode for the 16-channel radio is similar to that of the 10-channel radio. The same conditions are required to scan, that is, adjust the squelch control to squelch the radio, place the microphone on-hook, and press the SCAN button on the keyboard.

There are several differences in the 16-channel's scanner operation. If the microphone is lifted off-hook while the unit is scanning (no channel displayed and SCAN light blinking), the unit will jump to the priority channel and remain there until the mic is hung-up. However, when receiving a call on a non-priority channel, the radio will stay on that channel if the mic is lifted off-hook before the unit begins to scan again. When the mic is returned to its hook, the radio will resume scanning. This allows the user to answer a call on a non-priority channel without changing to that channel in manual mode and then resetting to scan mode when the conversation is over.

The time between the end of a received transmission and the resumption of scanning (scan delay time) can be adjusted to 0.68, 1.3, or 2 seconds. This selection is done during radio programming (see Section 2-2-3).

Programming the Scan List

Entering, deleting, and reviewing the channels in the scan list are done in the same way as the 10-channel radio. Pressing ENTER enters the channel in the list; pressing DELETE deletes a channel from the list, and pressing the MANUAL button reviews the channels in the scan list.

The Priority Function

The priority function is the same as the 10-channel radio's priority function. Press the PRIOR button to activate the priority function; press the PRIOR button again to deactivate it. The 16-channel radio will not jump to the priority channel when activating the priority function. Any time the PRIOR button is pressed and held, the radio will display the priority channel. Any time the microphone is lifted off-hook with the priority function activated, the radio will go to the priority channel and stay there until the mic is replaced on-hook.

Priority-Manual Operation

The priority-manual operation of the 16-channel radio is similar to the 10-channel radio except for the following.

The 16-channel radio will always return to the selected non-priority channel after monitoring a transmission on the priority channel even if the microphone was lifted off-hook.

Priority-Scan Operation

The priority-scan operation of the 16-channel radio is similar to the 10-channel radio except for the following.

When a radio locks-up on a non-priority channel, priority channel sampling will then begin. If a transmission is detected, the receiver will stay on the priority channel until it is over. Then, even if the microphone was taken off-hook, the radio will first switch back to the non-priority channel and check for activity there before resuming the scan.

B. Transmitter Operation

To transmit, select the desired channel (if you are in PRIORITY mode, the radio will automatically switch to the priority channel when the microphone is lifted), lift the microphone off-hook, monitor to be sure the channel is not in use, key the transmitter, and speak into the microphone. To key the transmitter, press the push-to-talk (PTT) button on the side of the microphone. Two-way conversation is accomplished by the push-to-talk, release-to-listen operation of the PTT button on the microphone. When transmitting a message, hold the microphone about two inches from your mouth and speak loudly and distinctly. Do not shout into the microphone as this will cause distortion.

Note that the PTT button on the microphone is not enabled when the microphone is on-hook (microphone hang-up button connected to chassis ground). Also, while transmitting, the keyboard is disabled so accidental pressing of a button on the keyboard will not interrupt the transmission.

The 16-channel radio has some standard features not present in the 10-channel radio. One is a time-out timer. The timer is to prevent accidental PTT operation from blocking a channel. The available time-outs are 30, 60, and 120 seconds. When programmed (see Section 2-2-3), the time-out function is enabled on all channels.

Another feature available on the 16-channel radio is that the transmit CTCSS tone frequency can be different than the receiver decoder tone frequency on the same channel.

SECTION 2 - SERVICE INFORMATION

2-1 INSTALLATION

WARNING: THIS UNIT IS DESIGNED TO OPERATE IN VEHICLES WHICH HAVE A 12 VDC NEGATIVE GROUND POWER SUPPLY.

Locate the radio in a convenient and accessible area in the vehicle's cab. Secure the mounting bracket and attach the radio. Mount the microphone hang-up clip. If the radio being installed has CTCSS programmed in it, then the microphone hang-up clip must be grounded to the vehicle's chassis. Connect the microphone.

Route the power cable supplied to the vehicle's battery. Connect the positive (red) lead to the positive (+) terminal on the battery; connect the negative (black) lead to the negative (-) terminal. Be sure to locate the wires away from any noise sources, such as the generator or alternator, ignition wires, etc. If there is not enough wire, splice additional wire to connect the leads to the battery. If the battery is located in an extremely remote location, find a buss connection that can handle a 15 amp current draw. Check this buss connection for ripple on the line. The ripple must be less than 200 mVrms, otherwise an alternator whine filter must be used (or find a better terminal block connection).

Mount the antenna and route the antenna feed cable to the radio. Connect the antenna and make adjustments for best radio to antenna match.

2-2 ALIGNMENT

2-2-1 Transmitter Alignment

A. Equipment Required

1. VHF Transceiver
2. DC Voltmeter
3. DC Power Supply w/Ammeter 13.6 VDC 15 Amps DC
4. AC Voltmeter
5. Audio Generator
6. Microphone Matching Network (Figure 3)
7. Thruline Wattmeter w/150 MHz 100 W Element
8. 40 dB 50 ohm Power Pad
9. Deviation Meter*
11. Frequency Counter*
11. Wide Blade Tuning Tool and Hex Tuning Tool
12. External Push-to-Talk Switch

*Can be replaced with IFR Communications Monitor or similar equipment.

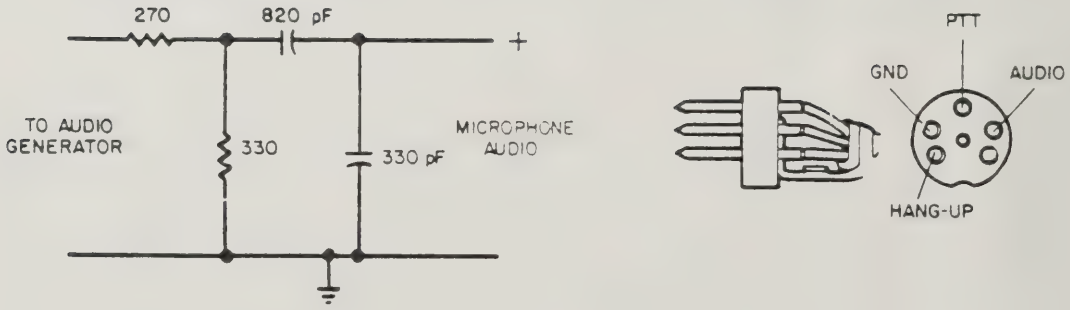


FIGURE 3 - MICROPHONE MATCHING NETWORK AND MICROPHONE PLUG DIAGRAM (WIRED ENDS TOWARD VIEWER)

B. Pre-Alignment Procedure (Refer to Figure 5)

1. Program the transceiver per the instructions given in the Programming Section.

2. Set up equipment as shown in Figure 4.

3. Set Power Supply to 13.6 VDC with DC Voltmeter.

4. Set the ferrite cores of L501, L502, L503, and L504 flush with the top of the coil form.

5. Turn transceiver on with the ON/OFF Volume Switch.

6. Insert PTT switch in microphone connector.

7. Monitor TP1 on VCO Board with DC Voltmeter with the negative lead grounded. Select the channel programmed for the highest frequency (transmit or receive) and adjust L201 so that 6.0 VDC is not exceeded for either transmit or receive. Similarly, select the channel programmed with the lowest frequency and adjust L201 so that the TP1 voltage does not drop below 3 VDC.

   TRANSCEIVER PERFORMANCE CANNOT BE GUARANTEED IF THE TP1 VOLTAGE LIES OUTSIDE THE 3-6 VDC RANGE.

8. When tuning for a transmitter bandwidth greater than 1 MHz, select a channel programmed for the center frequency ±100 KHz. If there is no channel near this frequency, reprogram a channel to it for tuning purposes.

9. Preset C302 on power amplifier so that the adjustment screw is snug.

C. Transmitter Tuning

1. Connect DC Voltmeter to test point M5. Key the transmitter and tune L501 and L502 for peak voltage on the Voltmeter. Tune L503 for a voltage dip on the Voltmeter. Tune L504 for peak voltage on the Voltmeter. This voltage will be about 0.5 V. Power should register on the power meter. If not, tune C325 for a power reading. Unkey the transmitter.

2. Monitor Power Meter. Tune C302, C319, and C325 for maximum output power.

3. If the transmitter bandwidth is less than 1.5 MHz, the amplifier should be tuned for best efficiency. On the channel with the highest frequency, adjust C325 clockwise (the direction that tightens) for an output power of 65 W.

D. Modulation Adjustment

1. Select a channel with no CTCSS tone. If all channels are programmed for CTCSS, adjust R561 fully counterclockwise.

2. Adjust the audio generator output for a 1 KHz sinusoid at 1 Vrms amplitude.

3. Key the transmitter and adjust R516 to the proper deviation level. If any channel is programmed for CTCSS tone, the proper deviation is ±4.0 kHz. If no channel is programmed for CTCSS tone, the proper deviation is ±4.5 kHz.

4. If the transceiver is programmed for CTCSS tone, set the audio generator output to 0.0 V. Adjust R561, CTCSS tone deviation control, to ±750 Hz. Check the other channels programmed for CTCSS to verify that the tone deviation lies between ±500 Hz and ±1 KHz deviation on each channel.

5. Unkey the transmitter.

E. Carrier Frequency Adjustment

1. Key transmitter.

2. Adjust C545 for the correct carrier frequency within ±100 Hz.

3. Unkey transmitter.

FIGURE 4

TRANSMITTER TEST INTERCONNECTION DIAGRAM

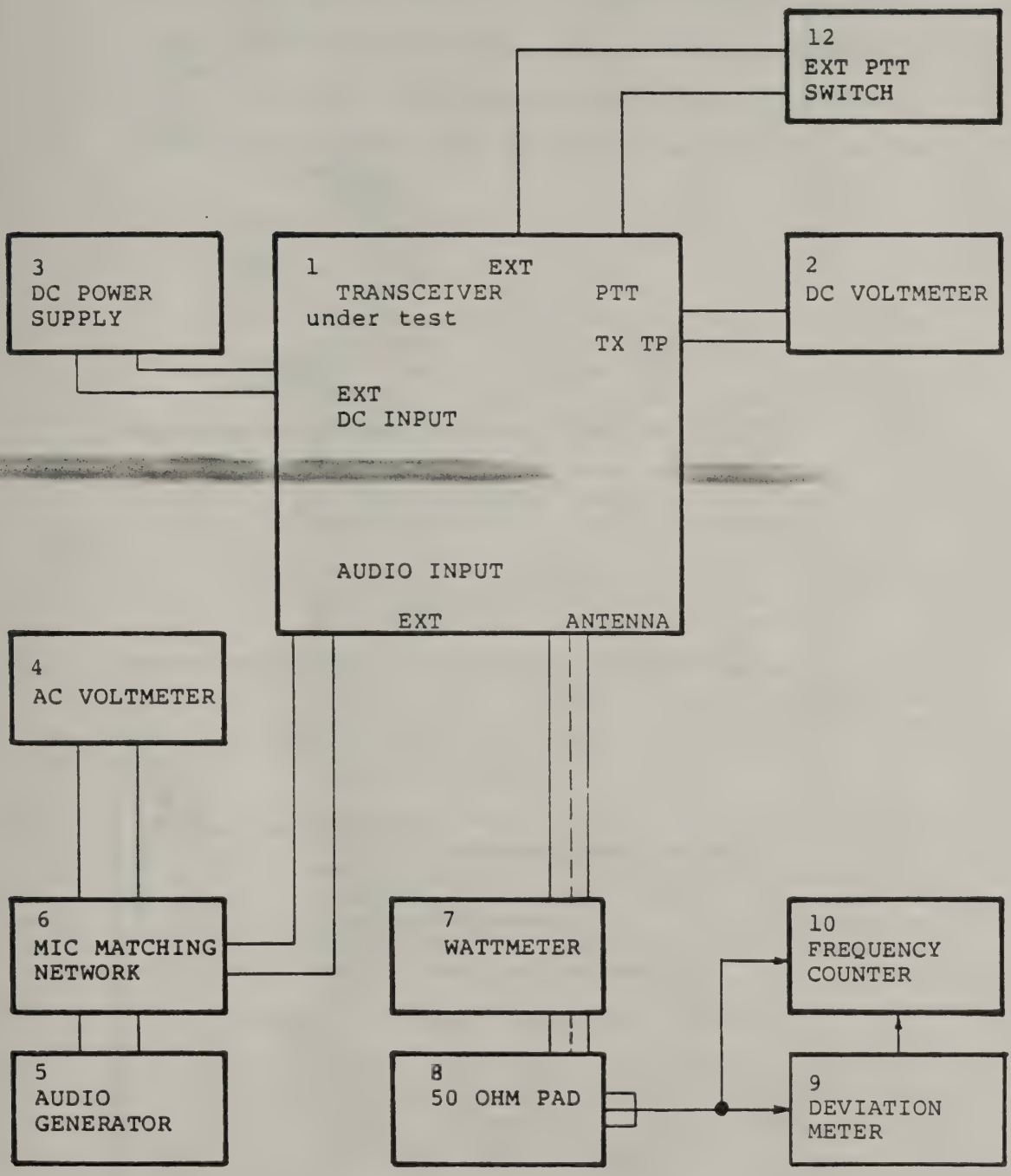
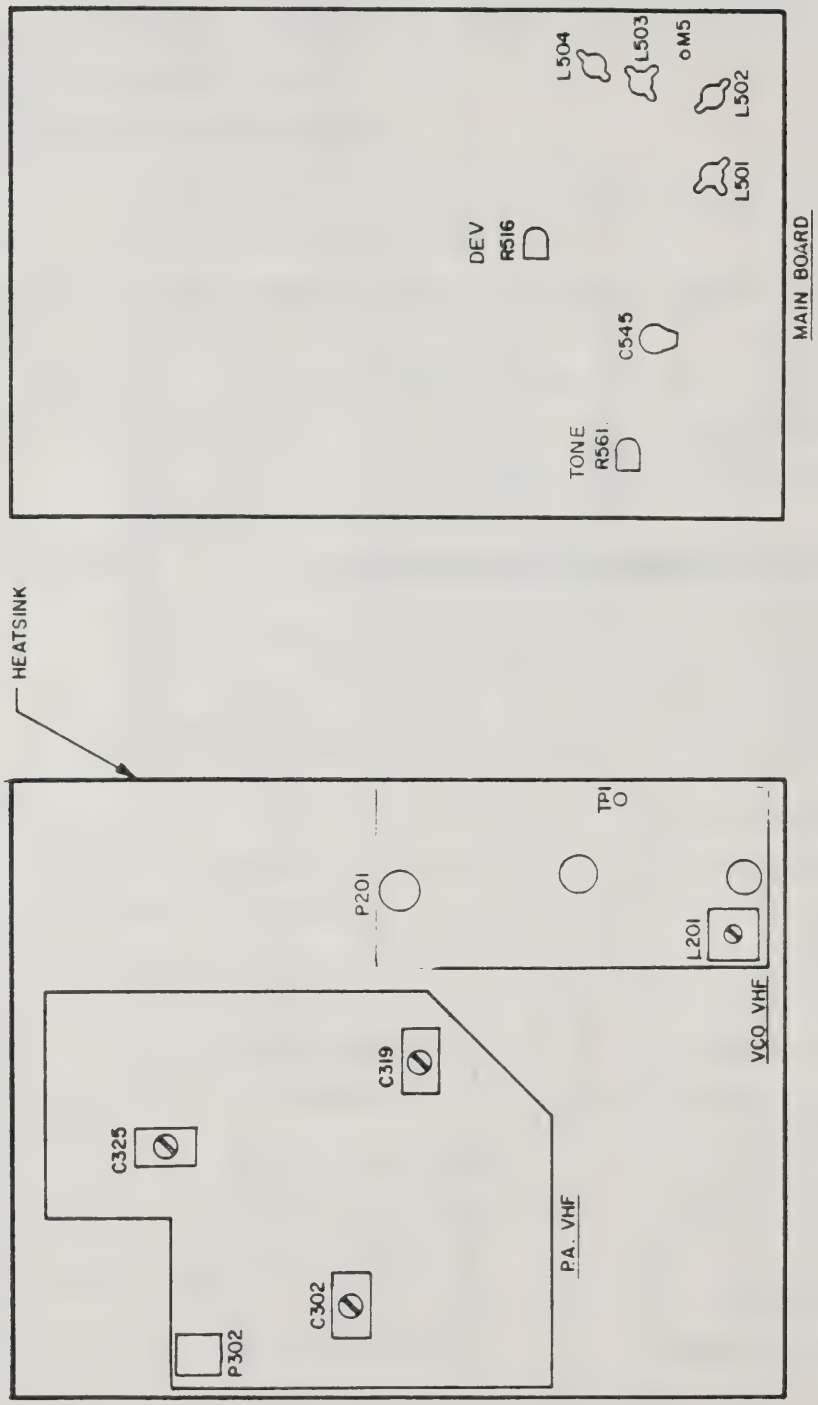


FIGURE 5

TRANSMITTER TUNING POINT DIAGRAM



C. Local Oscillator Adjustment

1. Connect a DC Voltmeter between M2 and ground.

2. Tune L405 for a dip in the Voltmeter reading.

3. Connect the Voltmeter between M3 and ground.

4. Tune L406 for peak voltage on the Voltmeter.

5. Retune L405 and L406 for a peak reading on the Voltmeter.

D. RF Circuit Adjustment

1. Method 1 - Quieting Method

a. Connect an AC Voltmeter across the speaker terminals. Unsquelch the radio and adjust the noise volume to a comfortable listening level. Note this reference level on the AC Voltmeter dB scale.

b. Connect an unmodulated RF Signal Generator to the antenna connector and set the generator to the receiver frequency.

c. Increase the RF output of the generator until the noise level drops 15 dB as read on the dB scale of the AC Voltmeter.

d. Tune L401, L402, L403, and L404 for minimum noise. While tuning, decrease the generator's RF output to maintain the noise level between the 20 and 15 dB quieting points.

e. Continue with Step d. until maximum quieting is obtained. A 20 dB quieting sensitivity of 0.5 uV or less should be measured. If not, then go on to IF Alignment Method 1. If the quieting measurement is correct, then go on to Discriminator Adjustment.

2. Method 2 - SINAD Distortion Method

a. Connect the SINAD Distortion Meter across the speaker terminals. Unsquelch the radio and adjust the volume to a comfortable listening level.

2-2-2 Receiver Alignment

A. Equipment Required

1. VHF Transceiver
2. VHF-FM Signal Generator*
3. AC Voltmeter
4. DC Power Supply
5. DC Voltmeter
6. Hex Tuning Tool
7. Small Blade Tuning Tool
8. Frequency Counter*
9. Sub-Audible Tone Generator
10. Oscilloscope to view 455 KHz
11. 3.2 ohm Speaker Load
12. Sinadder or Distortion Meter with 1000 Hz Notch Filter

*Can be replaced with IFR Communications Monitor or similar equipment.

B. Receiver Test Set-Up Instructions

1. Connect the equipment as shown in the Receiver Test Interconnection Diagram (Figure 6).

2. Complete Steps B.7 and E. of the Transmitter Alignment Procedure (Section 2-2-1), if not already accomplished.

3. Set power supply DC voltage to 13.8 VDC as measured on DC Voltmeter.

4. Set VHF-FM Signal Generator to the receive frequency, as measured on a Frequency Counter.

5. Set the receiver in the monitor mode (monitor switch set toward middle of receiver).

6. Set L401, L402, L403, L404, and L406 so that the core is flush with top of the coil form.

7. Set squelch control full clockwise to unsquelch the receiver and adjust the volume to a comfortable listening level.

8. With no signal to the radio and power on, adjust L409 for 4.5 VDC $\pm$0.25 V at Pin 10 of IC405.

9. Refer to Figure 7 for adjustment and test point locations.

b. Connect a modulated signal generator, set to the correct receive frequency, to the antenna connector. Modulate the generator with a 1 kHz tone at ±3.0 kHz deviation.

c. Increase the generator's RF output until a 6 dB SINAD is measured.

d. Adjust L401, L402, L403, and L404 for maximum SINAD ratio.

e. Decrese generator's output to maintain 6 dB SINAD and repeat Step d. until no improvement in SINAD can be made.

f. Measure 12 dB SINAD signal level. This level should be less than 0.35 uV (-116.1 dBm). If it is not, go on to IF Alignment Method 2. If satisfactory, go on to Discriminator Adjustment.

E. IF Adjustment

1. Method 1 - RF Level Method

a. Connect a scope between M4 and ground.

b. Connect an unmodulated signal generator to the antenna connector.

c. Increase the generator's output for a 100 mV peak-to-peak reading on the oscilloscope. The RF level should be approximately 20 uV (-81 dBm).

d. Adjust L407 for greatest peak-to-peak voltage on the scope.

2. Method 2 - SINAD Distortion Method

a. Connect a SINAD Distortion Meter across the speaker terminals.

b. Connect a signal generator, modulated as given in Step D.2.b., to the antenna connector.

c. Adjust the generator's RF output for a 6 dB SINAD reading on the meter.

d. Adjust L407 for the best SINAD.

F. Discriminator Adjustment

1. Connect an AC Voltmeter across the speaker terminals.

2. Connect a signal generator, modulated per Step D.2.b., to the antenna connector. Adjust the RF output level to 1 mV (-47 dBm).

3. Adjust L409 for maximum AC voltage on the meter.

FIGURE 6

RECEIVER TEST INTERCONNECTION DIAGRAM

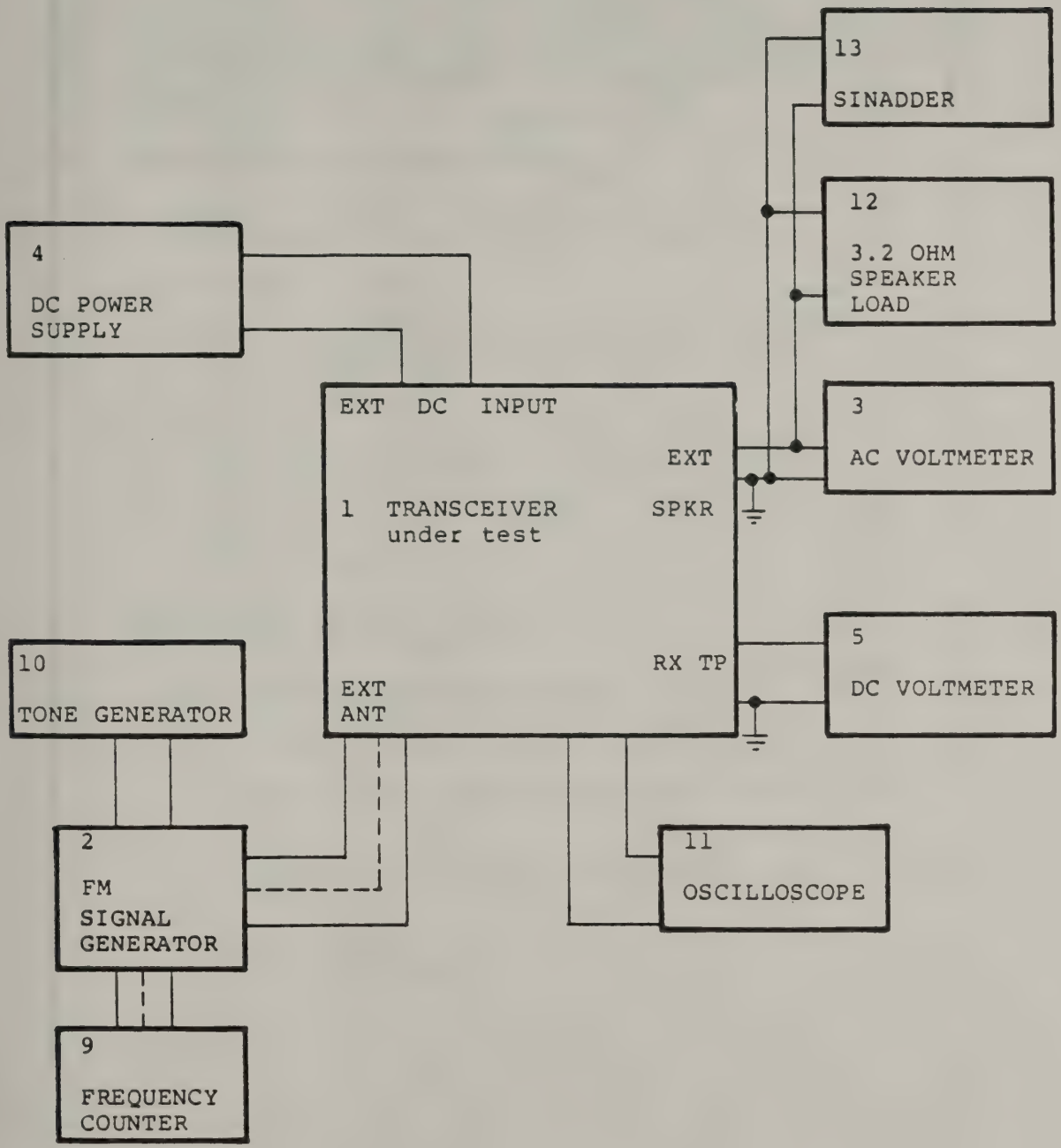
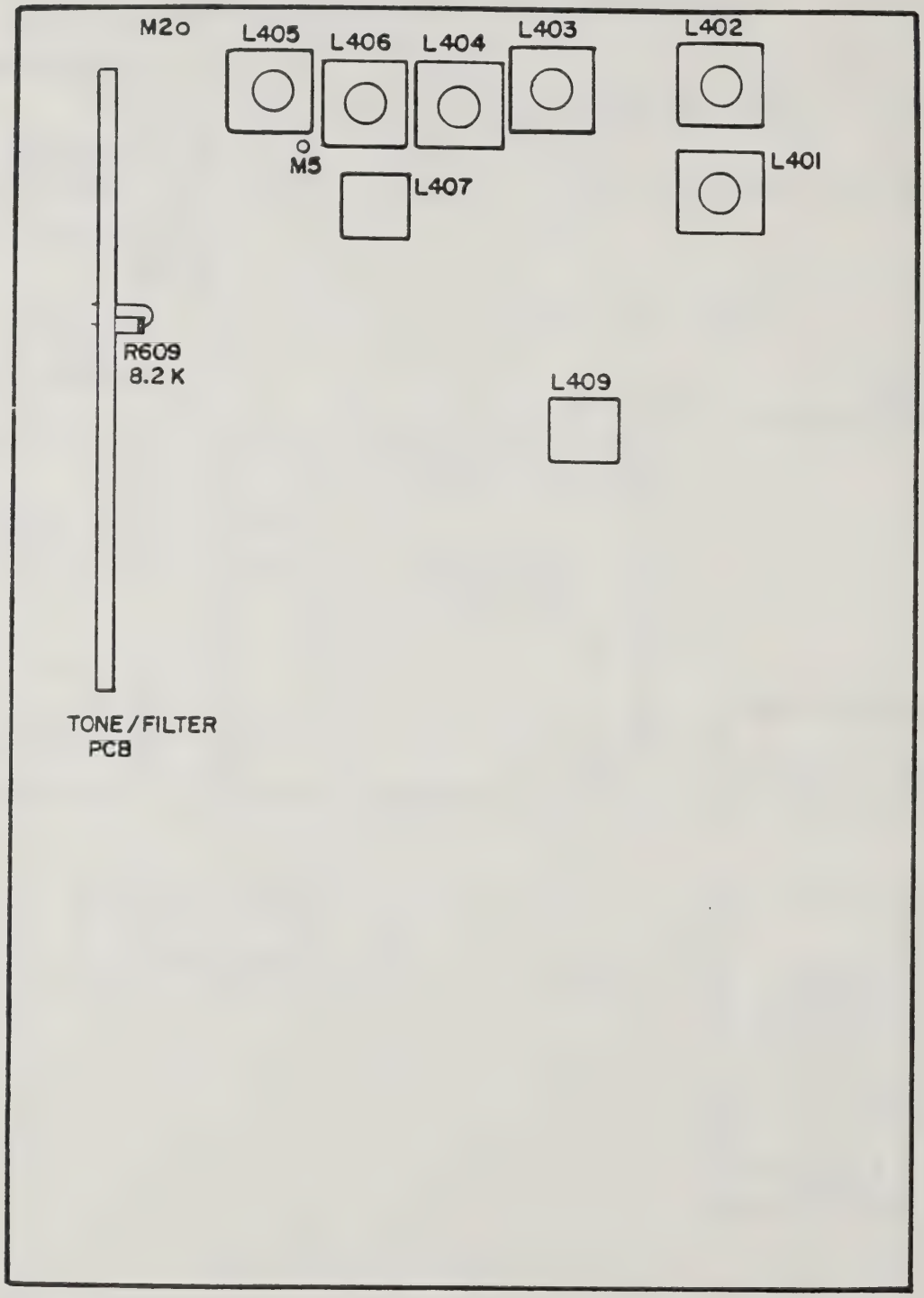


FIGURE 7

RECEIVER TEST AND ADJUSTMENT POINT DIAGRAM - MAIN BOARD



2-2-3 Programming the Radio

A. General

Programming of the RH/WH series radios can only be accomplished when the radio is placed in the program mode by following the directions in Section B. Section C describes the programming procedure for both 10 and 16-channel radios. Be sure to follow the procedure exactly, otherwise the radio will not perform properly.

B. Entering the Programming Mode

1. Before turning on the radio, be sure that the programming jumper, JU401, is installed.

2. Turn on the radio.

3. Enter the programming mode by pressing "PRO PRIOR" "10" on the keyboard. The display will go blank.

4. The radio is now in the program mode. The radio will remain in the program mode until turned off. The radio is now ready to accept programming data. Follow the programming procedure for the particular radio being programmed. When programming is completed, follow the instructions on exiting the program mode.

C. Programming (Note - to enter a zero (0), press the ten (10) button on the keyboard.)

1. Ten-Channel Radio Programming (RH600)

   a. Enter the program mode (see Section B).

   b. Key in the receiver frequency (6-digit code) in kHz.

   c. Select the simplex/half-duplex code (1-digit code)

      0 = simplex
      8 = half/duplex

d. Select CTCSS/transmitter operation code (1-digit code)

   0 = normal RX/TX operation
   (CTCSS encoder and encoder enabled if CTCSS tone selected)
   2 = Normal RX/TX operation
   (CTCSS encoder enabled only if CTCSS tone selected)
   4 = RX operation only; transmitter disabled
   (CTCSS decoder enabled if CTCSS tone selected)

e. Key in CTCSS tone code (2-digit code) from the table below.

Code	Frequency	Code	Frequency	Code	Frequency
00	no tone	13	103.5 Hz	26	162.2 Hz
01	67.0 Hz	14	107.2	27	167.9
02	71.9	15	110.9	28	173.8
03	74.4	16	114.8	29	179.9
04	77.0	17	118.8	30	186.2
05	79.7	18	123.0	31	192.8
06	82.5	19	127.3	32	203.5
07	85.4	20	131.8	33	210.7
08	88.5	21	136.5	34	218.1
09	91.5	22	141.3	35	225.7
10	94.8	23	146.2	36	233.6
11	97.4	24	151.4	37	241.8
12	100.0	25	156.7		

f. If an eight (8) was entered in Step c (half-duplex channel), then key in the transmit frequency in kHz (6-digit code).

g. Press the ENTER button on the keyboard.

h. Press the channel number the data is to be stored in. The channel number will be displayed after the data is stored.

i. Program the other channels by doing Steps b through h for each channel.

j. Delete any unprogrammed channels by pressing the DELETE button on the keyboard followed by pressing the ENTER button and the channel to be deleted. If deleting more than one channel, the DELETE button only needs to be pressed once followed by the ENTER - CHAN. NO. sequence for each channel to be deleted.

k. Review any channels that might be considered to be improperly programmed (see Section D).

l. Exit the programming mode by turning the power off. Remove the programming jumper, JU401.

2. Sixteen-Channel Radio Programming (WH6016)

a. Enter the program mode (see Section B).

b. Key in the receiver frequency in kHz (6-digit code).

c. Select the simplex/half-duplex code (1-digit code).

0 = simplex
8 = half-duplex

d. Select the transmitter operation code (1-digit code).

0 = normal RX/TX operation
4 = RX operation only; TX disabaled

e. Key in the RX CTCSS code from tone table given in 1.e (2-digit code).

f. Key in the TX CTCSS code from tone table given in 1.e (2-digit code). This step does not have to be done if programming a simplex channel with the same RX and TX tone. The TX tone code must be entered if programming a half-duplex channel.

g. Key in the TX frequency in kHz (6-digit code) if programming a half-duplex channel.

h. Press the ENTER button on the keyboard.

i. Press the channel the data is to be entered in. Note that when pressing the "1" button the tens digit on the channel display starts blinking the number 1. It will do this for about 2.5 seconds, waiting for a second digit to be entered (for channels 11 through 16). The display reverts to channel 1 if no second digit is entered in the allotted time; channel 1 will then be programmed with the data.

j. Repeat Steps b through i for all the channels to be programmed.

k. Delete any unprogrammed channels. Follow the same procedure described in 1.j.

l. Key in the scan delay code (1-digit code) from the table below.

Scan Delay	Code
.680 sec	0
1.3 sec	2
2.0 sec	4

m. Key in the Time-Out Timer code (1-digit code) from the table below.

Time Out	Code
NO time out	0
30 sec	1
60 sec	2
120 sec	4

n. Key in the Decode Interrupt Delay Code (1-digit code).

i. If the built-in CTCSS is used, key in "0".

ii. If another type of coded squelch system is used, key in the time delay for sampling the output of this system in hundreds of milliseconds (1 = 100 mS delay, 2 = 200 mS delay, etc., up to 9 = 900 mS delay).

o. Press the ENTER button on the keyboard.

p. Press the SCAN button on the keyboard.

q. Exit the programming mode by turning off the radio and removing the programming jumper, JU401.

D. Reviewing the Program

1. Before the channels can be reviewed, the radio must be in the programming mode. If the radio is already in the programming mode, then continue on to Step 2; if not, follow the procedure in Section B.

16-CHANNEL PROGRAMMING REFERENCE TABLE

Channel Programming Data Format: ┌Channel Programming Code─┐ Enter Chan No.

AAAAAA	B	C	DD	YY	ZZZZZZ		
①	②	③	④	⑤	⑥	⑦	⑧

Channel Programming Steps

1. Receiver Frequency (six digits)

   Note: For WH2516UK if the frequency is seven digits subtract 2.5 KHz and enter the results

2. Simplex/half-Duplex Code (one digit)

   Simplex: B=0 Half-Duplex: B=8

3. Transmitter Operation Code (one digit)

   Normal RX/TX operation: C=0 Disable Transmitter: C=4

4. Receiver CTCSS Tone Code (two digits)

   DD = See table at right

5. Transmitter CTCSS Tone Code (two digits)

   YY = See table at right. Does not need to be entered if Simplex channel and tone the same as 4. Must be specified if half-Duplex is programmed.

6. Transmitter Frequency (six digits)

   See note in 1. Does not need to be entered if Simplex channel.

7. Press the ENTER button on the keyboard

8. Press the channel number the data is to be entered into.

Frequency	Code
no tone	00
67.0 Hz	01
71.9	02
74.4	03
77.0	04
79.7	05
82.5	06
85.4	07
88.5	08
91.5	09
94.8	10
97.4	11
100.0	12
103.5	13
107.2	14
110.9	15
114.8	16
118.8	17
123.0	18
127.3	19
131.8	20
136.5	21
141.3	22
146.2	23
151.4	24
156.7	25
162.2	26
167.9	27
173.8	28
179.9	29
186.2	30
192.8	31
203.5	32
210.7	33
218.1	34
225.7	35
233.6	36
241.8	37

Radio Configuration Data Format: T W X Enter Scan

T	W	X		
①	②	③	④	⑤

Radio Configuration Programming Steps

1. Scan Delay Code

Delay	T for A,B,C	T for UK
.68 sec	0	1
1.3 sec	2	3
2.0 sec	4	5

2. T.O.T. Code

	W
No T.O.T.	0
30 sec	1
60 sec	2
120 sec	4

3. Key in the Decoder Interrupt Delay code from the table below:

Decoder	Delay	Code
Built-In CTCSS	0	0
External	100 ms	1
External	200	2
External	300	3
External	400	4
External	500	5
External	600	6
External	700	7
External	800	8
External	900	9

NOTE: When using external decoder consult the factory.

4. Press ENTER

5. Press SCAN

   Channel display will display a "u"

10-CHANNEL PROGRAMMING REFERENCE CARD

Programming Data Format: [AAAAAA] [B] [C] [DD] [ZZZZZZ] Enter Chan No.
Programming Data: AAAAAA = ①, B = ②, C = ③, DD = ④, ZZZZZZ = ⑤, Enter = ⑥, Chan No. = ⑦

Programming Steps

1. Receiver Frequency (six digits)

2. Simplex/half Duplex Code (one digit)
   Simplex: B=0 half Duplex: B=8

3. CTCSS/Transmitter Operation Code (one digit)
   C=0 for normal RX/TX operation (CTCSS - Decode/Encode)
   C=2 for normal RX/TX operation (CTCSS - Encode only)
   C=4 for transmitter disabled (CTCSS - Decode only)

4. CTCSS Tone Code (two digits)
   DD = See table at right

5. Transmitter Frequency (six digits)
   See note on 1. Only to be entered for half/Duplex operation.

6. Press ENTER

7. Press the channel number the data is to be entered in.

Frequency	Code
no tone	00
67.0 Hz	01
71.9	02
74.4	03
77.0	04
79.7	05
82.5	06
85.4	07
88.5	08
91.5	09
94.8	10
97.4	11
100.0	12
103.5	13
107.2	14
110.9	15
114.8	16
118.8	17
123.0	18
127.3	19
131.8	20
136.5	21
141.3	22
146.2	23
151.4	24
156.7	25
162.2	26
167.9	27
173.8	28
179.9	29
186.2	30
192.8	31
203.5	32
210.7	33
218.1	34
225.7	35
233.6	36
241.8	37

2. Reviewing the program is the same for both 10- and 16-channel models.

   a. Press the MANUAL button on the keyboard.

   b. Press the channel number to be reviewed. Note that when reviewing channel 1 on the 16-channel radio, a "1" will flash in the tens digit. This is not part of the channel's program; the radio is just waiting for the second digit entry for channels 11 through 16.

      The radio will display, using the ones digit on the channel display, the programmed data for the selected channel. Each data digit is displayed for two seconds, starting with the receiver frequency through to the transmitter frequency in the same order the channel was programmed.

3. Reviewing the radio configuration (16-channel radio only)

   a. Press the MANUAL button on the keyboard.

   b. Press the SCAN button on the keyboard. The ones digit on the channel display will display in order: the scan delay code, the time-out-timer code, and the decode interrupt delay code, in that order (each code displayed for two seconds).

4. If leaving the programming mode, turn off the radio and remove the programming jumper, JU401.

2-3 INITIAL TESTS

Before installing the unit, perform the following checks. Select and test each channel for:

1. Proper receiver sensitivity (.35 uV SINAD max)
2. Proper transmitter power output (60 W min)
3. Correct transmitter carrier frequency (±100 Hz)
4. Correct modulation deviation limiting point

   ±4 kHz peak - A,B,C models with a CTCSS channel
   ±4.5 kHz peak - A,B,C models without CTCSS

5. Correct CTCSS tone modulation (if applicable)

   ±750 Hz peak - A,B,C models

6. Proper CTCSS decoder operation (if applicable)
7. Correct CTCSS encoding frequency (if applicable)
8. Correct VCO voltage in RX and TX modes (between 3-6 VDC)

Select all the functions on the keypad to be sure they are operable. For example, place the radio in the scan mode and make sure it will lock-up on a busy channel. Check the Priority Function and Priority Scan mode for proper operation. Be sure all the LEDs are lighting correctly.

After installation, test the unit on an operational channel, testing out any encoder options, for example, to see if the system responds correctly. Start and run the vehicle to be sure there is no interference with the radio's performance.

2-4 CIRCUIT DESCRIPTIONS

Receiver (Refer to Figure 8 - Block Diagram and Schematics)

The received signal passes through a solid state T/R switch on the PA board and then to the RF amplifier Q409 on the Main Board. The output of the RF amp is coupled to the gate circuit of the mixer stage, Q410. The signal of the first local oscillator (LO) is fed to the source input of the mixer transistor, Q410. The first LO's frequency is 10.7 MHz below the received signal's carrier frequency.

The resultant 10.7 MHz signal from the mixer is filtered by a four-pole crystal filter. The filtered 10.7 MHz signal is fed to the IF integrated circuit. The IF chip contains the second LO and second mixer. The second LO's frequency is 10.245 MHz. By mixing the 10.7 signal and the second LO, the second IF is obtained, 455 kHz, which is filtered by a ceramic filter, CF401. The filtered 455 kHz is passed through limiting amplifiers and then coupled to a quadrature detector. The quadrature detector (in IC405 along with

L409) converts the frequency modulated signal to an amplitude modulated (voltage) signal. The audio output is Pin 10 of IC405.

The audio output from the quadrature detector, Pin 10, is applied to the de-emphasis circuit, R609 and C603 on the Filter Board, and to the input of the low-pass tone filter, IC601 (C and B). The low-pass tone filter amplifies the tone and filters out the audio voice signals. The output of the tone filter is fed into a Schmitt trigger, Q602 and Q603, which shapes the tones into the correct digital waveforms for the uP to decode. If the correct tone is decoded, the uP will turn the MSG LED on and un-mute the receive audio path. After the de-emphasis circuit, the receive voice audio passes through a high-pass filter, IC601 (D and A). The high-pass filter reduces the amplitude of the tone signal to an acceptable level in the receive audio path with a minimal affect on the overall receive audio.

The input to the squelch circuit is restricted to high frequency audio, approximately 6 to 25 kHz, by the use of R and C components. The "noise" occurring in this range is amplified by IC405 and detected by CR410. The DC voltage resulting from the detected "noise" is applied to IC405, Pin 14, which drives Pin 16 low and activates the squelch switch circuit, Q411, Q412, and Q413. When the "noise" is of sufficient amplitude, the audio is turned off and the receiver is muted. When a signal appears, the "noise" is reduced to a point where the detected signal is no longer sufficient to mute the audio.

On a channel that is programmed for receive CTCSS (with the microphone on hook and the monitor switch not in the MON position), Pin 28 of the uP, IC403, will activate the squelch switch muting the audio until it decodes the correct tone frequency from the Schmitt trigger circuit on the Filter Board. This occurs even though the noise detected by the squelch circuit is reduced by a receive signal of the correct RF carrier frequency. When the correct subaudible tone is detected, the uP releases the squelch switch, allowing the audio signal to pass on to the audio amplifier, IC406, and then to the speaker.

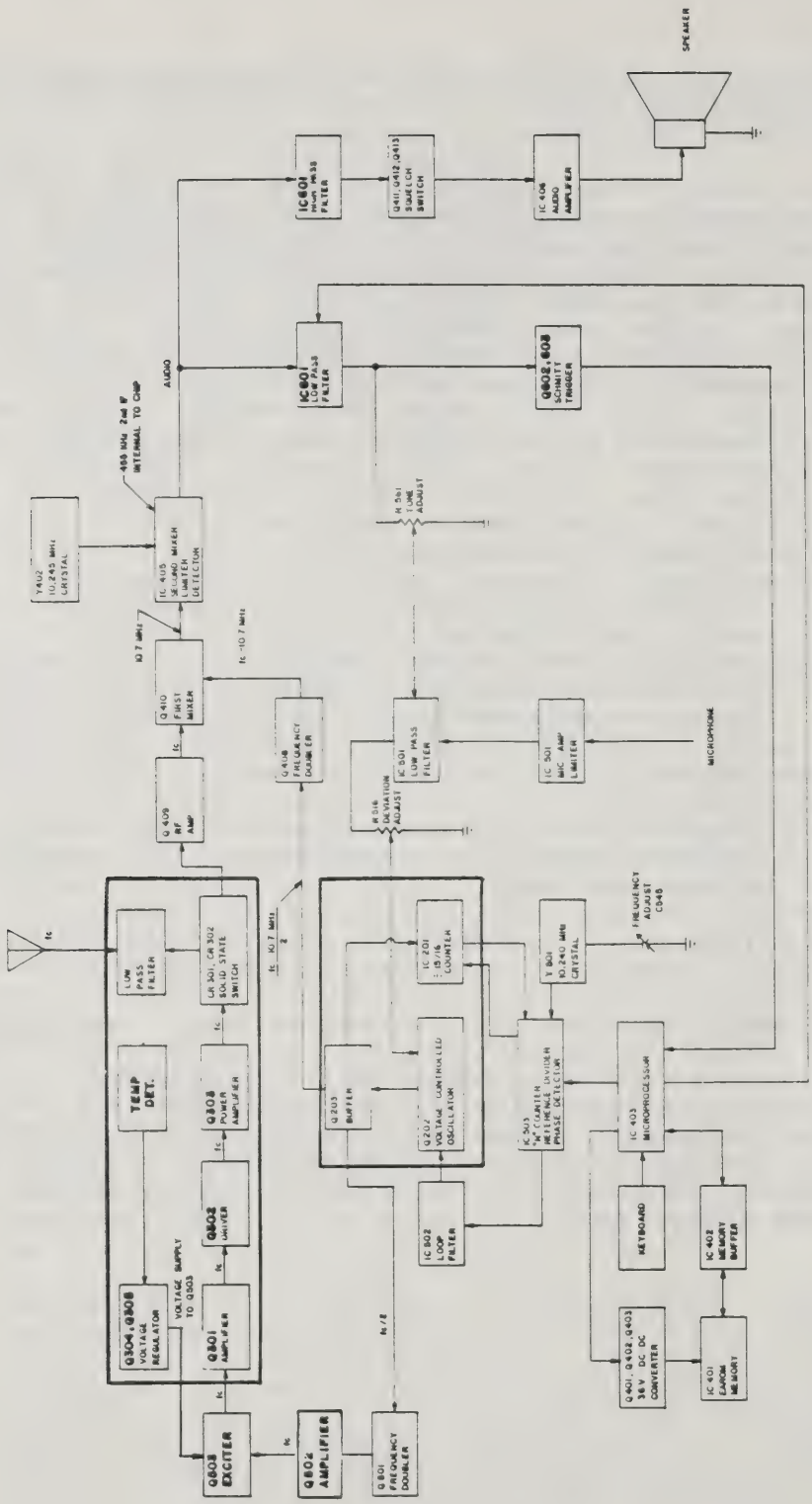


FIGURE 8 - BLOCK DIAGRAM

Transmitter (Refer to Figure 8 - Block Diagram and Schematics)

Audio speech is converted from air pressure variations to an electrical signal by the microphone, which also pre-emphasizes the audio signal by 6 dB per octave. This signal is then applied to two operational amplifiers, IC501D and IC501A. The Modulation Limiter is the second operational amplifier, IC501A. There is sufficient gain in the first and second operational amplifier so when a signal is applied which is 20 dB greater than that required fora 3 kHz deviation, the second operational amplifier will go into limiting.

After the audio signal is limited, it passes through a four-pole active low-pass filter. This active filter consists of the third and fourth operational amplifiers of IC501 (B and C) and its associated resistors and capacitors. The resultant signal is then limited with respect to sideband splatter and has an 18 dB per octave roll-off above 3 kHz.

The CTCSS tones are applied after the audio limiter but before the TX audio low-pass filter. The tones are generated by the uP and their harmonics are filtered by the low-pass filter, IC601, on the Filter Board. R561 is used for the adjustment of the tone modulation signal.

The output of the modulation amplifier/post limiter filter circuit, Pin 8 of IC501, is fed to a master deviation control (R516). This control is set by running the modulation amplifier into full limiting and adjusting R516 for maximum system deviation.

The audio is then applied to a varactor frequency modulator on the VCO Board. The varactor, CR201, is series-coupled through C217 and C218 to the voltage-controlled oscillator, VCO. By varying the voltage on the varactor diode at an audio rate, the resonant frequency of the VCO is varied, which results in the oscillator output being frequency modulated at the audio frequency. The capacitance change versus voltage of the varactor is almost linear, which results in low distortion. The frequency doubling stage, Q501, increases both the VCO frequency and the deviation to the desired value.

The input to Q501 is one half (1/2) the carrier frequency and after passing through Q501, the signal is "rich" in harmonics of the input frequency. L501 and L502 are tuned for the carrier frequency and have attenuation to the fundamental and other harmonics. The signal is then amplified by Q502 and further attenuation to the fundamental and harmonics is achieved by L503 and L504. Q503 further amplifies the signal to the level necessary to excite the PA Board.

On the PA Board, Q301, 302, and 303 amplify the signal to the desired final output power. The output of Q303 is matched to 50 ohms by C325, C326, and the PC stripline. These stages, along with Q503, all operate in the Class C mode.

During transmit, biasing current is supplied to pin diodes, CR301 and CR302. When CR302 is biased "on," a short-to-ground is provided at this point which, through phase rotation in L307 and C331, presents a high impedance to the RF path and prevents the RF power from going to the receiver. Also, when CR301 is turned "on," it presents a low impedance to the RF power, thereby allowing the RF power to go into the low-pass filter.

Harmonic suppression, which reduces the harmonics of the carrier below the level that is required by the FCC, is provided by the output low-pass filter. This filter is composed of L308, L309, C332, C333, C334, and C338. The cutoff frequency is approximately 210 MHz.

The temperature of the power amplifier, Q303, is monitored by the RT301 thermistor. If, for any reason, Q303 begins to get overheated, Q304 will shut down the regulator circuit formed by CR304 and Q305. This regulator is the operating voltage source of the PA exciter, Q503. With its supply voltage removed, Q503 can not drive the PA to put out power until Q303's temperature is below the critical point.

Control Board

The digital displays, DS101 and DS102, on the Control Board are seven-segment yellow LED channel displays. These displays are controlled by circuitry on the Main Board. Binary-coded decimal information is sent to the decoder/driver, IC404, from the uP for DS102. IC404 then drives DS102 to show the correct decoded number. DS101 is controlled by Q407 which is activated by the uP.

The TX, SCAN, MSG, and PRIORITY LEDs are controlled by Q101, Q102, Q103, and Q104, respectively. These transistors are used as NPN saturated switches which are activated directly by the uP. Q101 is controlled by the TX 9.5 V supply; Q102, Q103, and Q104 are controlled by the microprocessor, IC403.

The MON switch, SW101, is a SPDT switch used to disable the tone decoding when on a tone channel and to reset the MSG LED. The DAY-NIGHT switch SW102, is a DPDT switch used to control the brightness of the display and the illumination of the keyboard. In the DAY position, the displays are driven by 5 V and the keyboard is not lit. In the NIGHT position,

the displays are driven by 2.9 V because three diodes are added in series with the 5 V line to the displays. Also in the NIGHT position, the keyboard is illuminated by an incandescent light bulb in conjunction with a light-bar.

The volume control, R101, takes the audio from the squelch switch circuit and controls the voltage level going to the audio amplifier, IC406. The squelch control, R102, controls the amplitude of noise signal supplied to the input of the squelch noise amplifier, Pin 12 of IC405.

Synthesizer

The synthesizer consists of a voltage-controlled oscillator (VCO), reference oscillator, "N" and "A" dividers, phase detector, and a low-pass loop filter. The digital information for the synthesizer to be at one half (1/2) the correct frequency for the receiver or the transmitter comes from the uP. The synthesizer integrated circuit, IC503, contains the reference oscillator, "N" divider, phase detector, out-of-lock detector, and receive/transmit switches.

The VCO consists of Q202, L201, C217, C209, C205, C218, C208, C207, CR201, and CR202. The frequency of the oscillator is determined by the voltage across CR202. This frequency is divided by either 15 or 16 by IC201. The resultant frequency is then divided by a programmable "N," contained in IC503, which results in a frequency close to 2500 Hz.

The reference oscillator consists of Y501, IC503, C543, C544, and C545, which is used for fine frequency adjustment. The oscillator is a parallel resonant Colpitts type. The reference oscillator has a heater-controlled crystal, Y501. This crystal is specified to ensure that the frequency stability between -5°C and 65°C is within 0.0005%. The heater resistor, R545, begins to heat up at approximately +10°C and is well activated at 0°C, thereby keeping the crystal temperature above 0°. This ensures 0.0005% frequency stability over the temperature range of -30°C to +60°C for both the receiver and transmitter. C543, C544, and C545 are NPO ceramic capacitors, thereby adding additional stability to the oscillator. The reference oscillator frequency of 10.240 MHz is divided by 4,096 and the resultant frequency is 2500 Hz.

The reference 2500 Hz signal is compared to the signal out of the : N counter (internally) and an error signal is generated at Pin 4 of IC503.

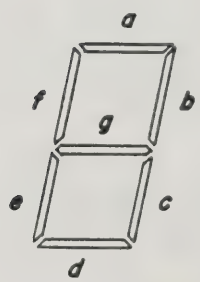
The error voltage from the phase detector is then amplified and filtered by IC502 and becomes the control voltage for the VCO. This voltage is applied to CR202 and changes the VCO frequency in a direction that reduces the phase differences between the reference oscillator frequency and the VCO frequency. When the loop is "LOCKED," the frequency of the VCO is proportional to the average frequency of the input signal from the reference oscillator.

Microprocessor and EAROM

The microprocessor, IC403, acts as a central controller. It monitors inputs such as the keyboard, the EAROM, PTT line, monitor switch, hook switch, programming jumper, squelch and CTCSS tone input. It controls the display and status LEDs, information placed in the EAROM, receiver squelch operation, the beep for keyboard contact closure, synthesizer frequency, CTCSS tone frequency, and transmitter/modulation enable line.

Starting with the keyboard, which is a 4 x 4 crosspoint matrix, the column contacts are connected to Pins 3, 4, 5, and 6 of IC403 and the row contacts are connected to Pins 19, 18, 17, and 16 of IC403. Whenever the radio is idle, the column lines are low (less than 0.8 VDC) and the row lines are high (greater than 2 VDC). When a contact is closed, the microprocessor senses a change on one of the row lines and investigates further to determine which column closure caused the row line to go low. The voltages on the schematic are when the keyboard is idle.

The display and status LEDs are controlled by the microprocessor. DS101 displays a one (1) when Q407 is turned on. When Channel 10 is selected, the base voltage will be 0.7 V. DS102 is driven by a BCD to seven-segment decoder, IC404. The display segments are defined below in Figure 9.



DISPLAY	BCD CODE D	C	B	A
0	0	0	0	0
1	0	0	0	1
2	0	0	1	0
3	0	0	1	1
4	0	1	0	0
5	0	1	0	1
6	0	1	1	0
7	0	1	1	1
8	1	0	0	0
9	1	0	0	1

FIGURE 9

The inputs to IC404 are four (4) BCD (binary-coded decimal) lines (A,B,C, and D) from the microprocessor, IC403. A zero is displayed when the BCD lines are all low (less than 0.8 V) as shown in the table of Figure 9. For a zero the a, b, c, d, e, and f segments are turned on by pulling Pins 1, 13, 10, 8, 7, and 2 low, respectively. The microprocessor also controls the PRIORITY, MSG, and SCAN LEDs through Q104, Q103, and Q102, respectively. Turning on the transistors causes the LEDs to turn on.

CTCSS tones are both encoded from and decoded by the microprocessor. The encoded tone is derived from the signals at Pins 30, 31, and 32 of IC403. These are summed and filtered on the VCO/Filter Board. The CTCSS tone signal received after filtering and shaping on the VCO/Filter Board is interrogated by the microprocessor at Pin 38. The microprocessor, if programmed for CTCSS, will interrogate the signal on the line provided a carrier is present. Carrier detection is accomplished by momentarily looking at the squelch control line (the line is being used as an input in this case) to determine whether the radio is squelched or not. The squelch circuit must be operative, i.e. the squelch control must be adjusted so that without a carrier present there is no noise from the speaker. The reason this is done is to eliminate false decodes on noise. When a signal is received and the correct tone is present, the microprocessor releases the squelch control line (Pin 28 of IC403 now acting as an output). The microprocessor will also release the squelch control line when Pins 14 or 23 go high; this occurs when the microphone goes off-hook or the monitor switch is in the MON position.

The CTCSS tone frequency is determined by counting circuitry in the microprocessor. The time base reference for these tones comes from the timing oscillator of the microprocessor. The oscillator's frequency is 3.579545 MHz. This oscillator serves as the clock for the microprocessor and is essential for its operation.

The microprocessor programs and reviews information, stored in the EAROM, through a buffer, IC402. This IC translates voltage levels between 5 V (microprocessor side) to 15 V (EAROM side). The inputs, driven by 0 and 5 V levels, are Pins 2, 5, 7, 9, 11, and 14. The outputs, 0 and 15 V level drivers are Pins 3, 4, 6, 10, 12, and 15. The voltages on the schematic are static, that is the voltages shown are when the EAROM is idle.

When the EAROM is accessed (for a read or write operation) the high voltage supply is activated (by the microprocessor). The collector of Q403 pulses low to activate the high voltage supply. During this time there is a +15 V level at Pin 1 and a -21 V level at Pin 2 of IC401. The status LEDs also flicker during an EAROM access.

The receiver and transmitter frequency codes are controlled by the microprocessor. The microprocessor takes the stored information from the EAROM and serially transmits it to the synthesizer chip, IC503 (SYNTH DATA, SYNTH CLOCK lines). The synthesizer clock path (SYNTH CLOCK) is the line connecting Pin 8 of IC403 to Pin 9 of IC503. The synthesizer data path (SYNTH DATA) is the line connecting Pin 9 of IC403 to Pin 10 of IC503. Both lines are normally low when in an idle state. During data transfer the clock line alternates between +5 V and 0 V, around a frequency of 12.8 kHz, clocking the data into IC503. When the radio is turned on, the microprocessor is reset by the delay in voltage rise on Pin 39 caused by C470. A low on this line restarts the microprocessor and the radio will "set-up" on the priority channel.

The 16-channel radio has a different reset circuit than the 10-channel radio. Instead of C470 resetting the microprocessor a transistor, Q405, does. When the radio is turned on, Q405 turns on when the 13 V switched line (which biases Q405 via R420) reaches 0.7 V. When the voltage on the 13 V switched line reaches 8 V, Q404 is biased on, thereby turning off Q405. This series of events holds Pin 39 of IC403 low while the 5 V supply stabilizes. Any time the 13 V line fluctuates below 8 V, the microprocessor will be reset. This allows the microprocessor to be held in reset before the 5 V supply becomes unregulated.

36 V Supply and Control Switching

The 36 V DC to DC converter is controlled by the uP. To test if the 36 V power supply is operating correctly, ground the collector of Q403 to turn on the DC to DC converter. The main components of the 36 V supply are T401, Q401, Q402, CR401, CR402, CR403, R401, R402, R403, R404, C401, C402, and C403. When activated, there is approximately +15 V on the cathode of the 36 V Zener diode, CR403, and -21 V on the anode of CR403 (voltages are relative to chassis ground).

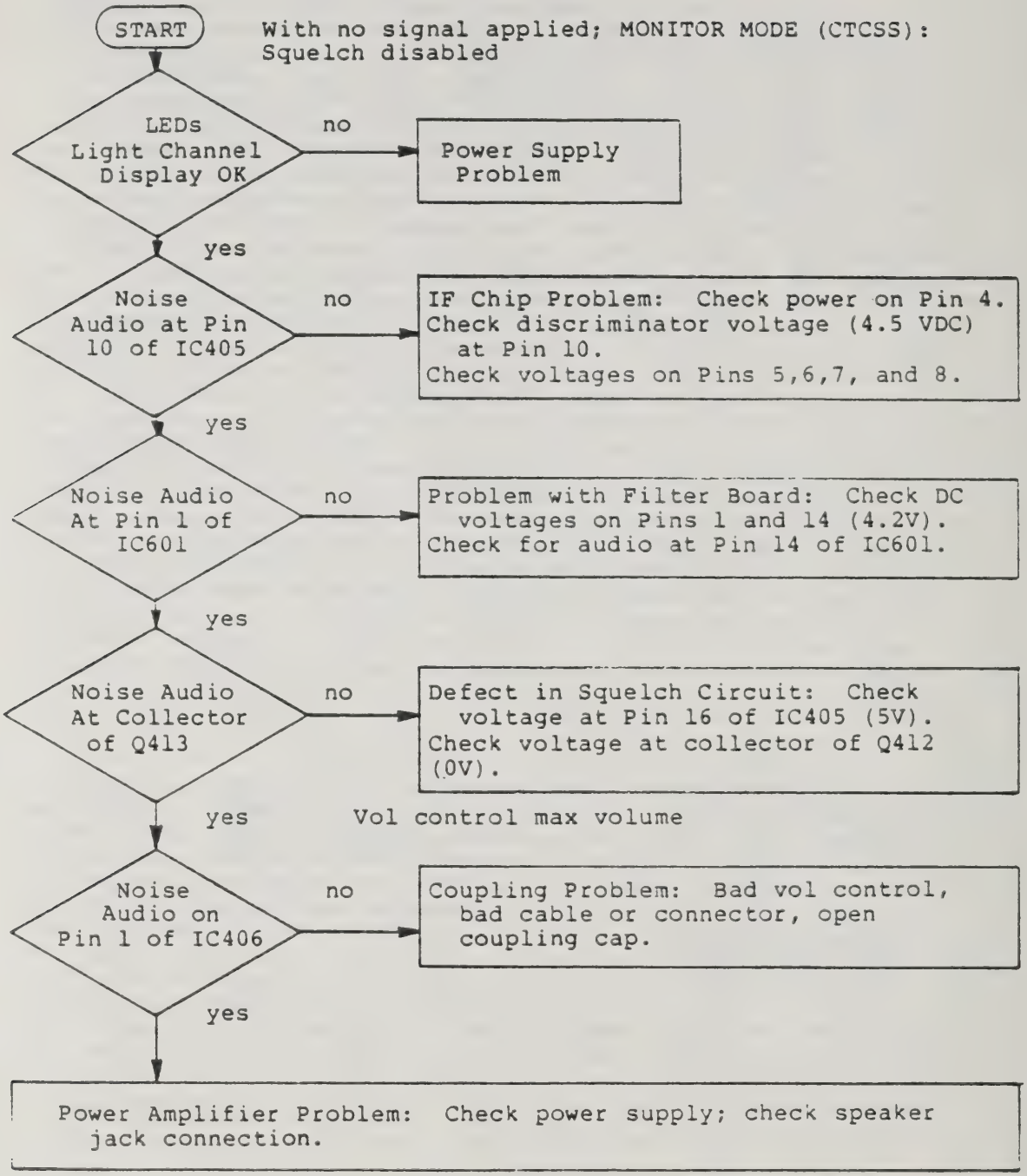
The radio's main power, 13 V at J3, is regulated into two supplies. The digital circuits associated with the microprocessor and synthesizer derive power from the 5 V supply (regulated by IC504). The circuits which derive power from the 9.5 V supply are as follows: the receiver's RF, IF and audio circuits; the transmitter's modulation and exciter circuits; and the VCO oscillator, buffer and loop filter circuits.

The receiver circuits receive a switched 9.5 V voltage which is controlled by Q508, Q507 and the synthesizer chip (IC503, Pin 12). In the receive mode the base of Q507 is around 0.7 V. Q507 saturates, turning on Q508. The transmitter power supply to the exciter is a switched 9.5 V voltage also. This voltage is controlled by Q505, Q509, Q506, the synthesizer chip (IC503, Pin 13), Q406, and the microprocessor (IC403, Pin 27). Q509 is turned on only if three conditions are met. First, the transmitter frequency data transferred to the synthesizer IC must be received correctly; second, the phase-lock loop must be "LOCKED"; third, the microprocessor must release the ENABLE line. The synthesizer chip releases the TX ENABLE line at Pin 13 of IC503 if the TX frequency information is correctly received. When the synthesizer is phase-locked (voltage at TP1 between 3 and 6 VDC and adjustable by L201), Pin 7 of IC503 will be 4.9 VDC. If, and when, the synthesizer loop goes out of lock, Pin 7 of IC503 pulses low, holding the voltage at Pin 13, IC503 to around 0.8 VDC. The microprocessor releases the TX ENABLE line by pulling the base of Q506 below 0.5 VDC via Q406. Q406 also pulls the base line of Q201 low, activating the modulation varactor on the VCO Board. When these three conditions are met, the TX ENABLE line is at 1.6 VDC, turning on Q509; this, in turn, allows the exciter to receive its supply voltage. Q509 also turns on Q510, allowing a switched 13.8 V line to activate the transmit relay on the PA Board. This, in turn, supplies voltage through the thermal protection circuit to the PA exciter, Q503.

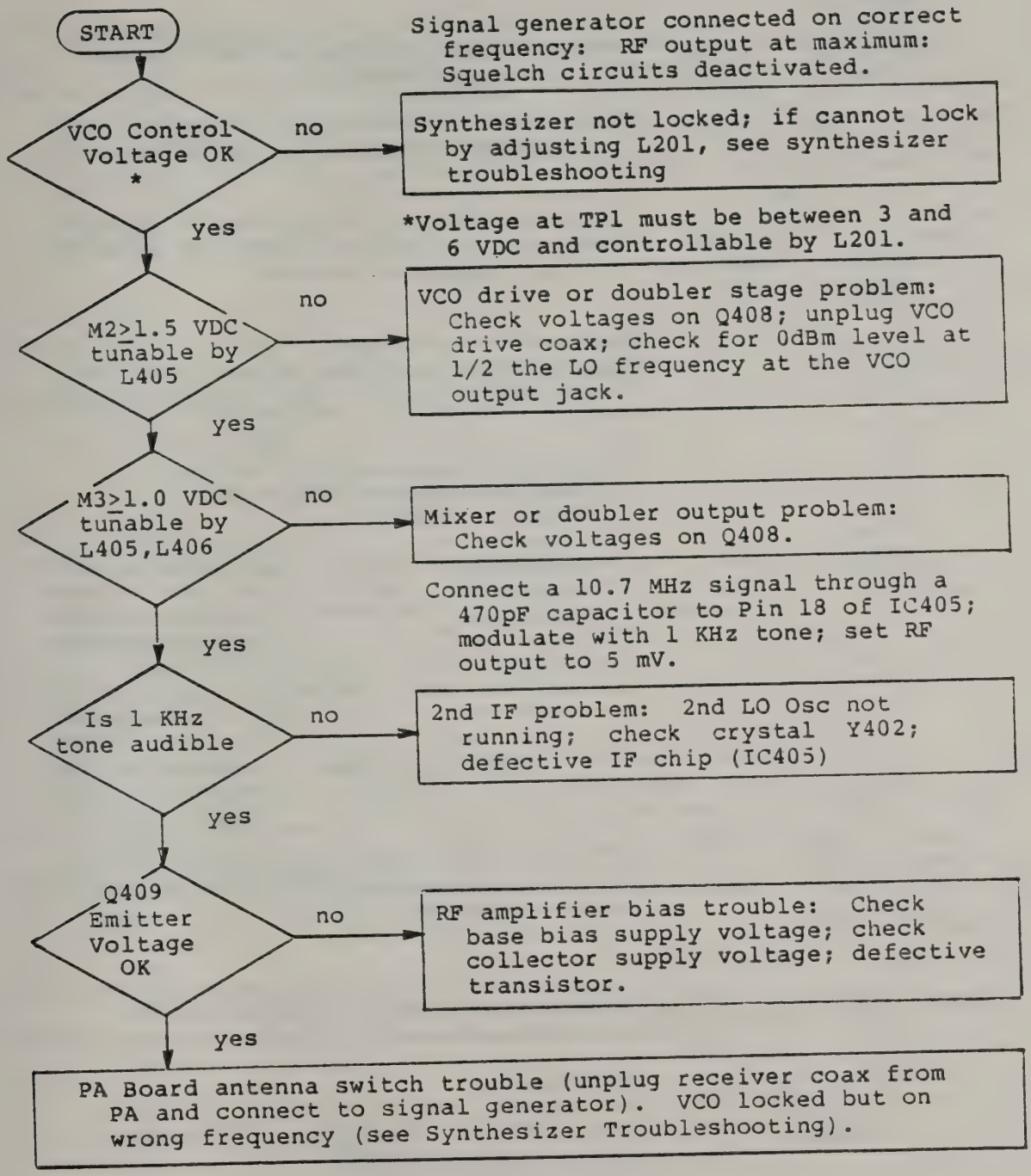
2-5 TROUBLESHOOTING

The troubleshooting flow charts on the following pages are designed to aid in localizing the problem area. Once the problem area is localized, use voltage measurement data, visual inspections of components in the area, and other troubleshooting practices to find the defective component. The voltages shown on the Schematics are all referenced to ground. They were made with a voltmeter having a 10 megohm input impedance.

PROBLEM 1 - RECEIVER COMPLETELY DEAD



PROBLEM 2 - RECEIVER NOISE PRESENT BUT WILL NOT RECEIVE A SIGNAL



PROBLEM 3 - RECEIVER AND TRANSMITTER OFF FREQUENCY

START

VCO/Synth locked up* — no → See Synthesizer Out-of-Lock Trouble-shooting Procedure.

*Must have voltage at TP1 between 3 and 6 VDC and controllable by L201.

yes

Measuring the signal at Pin 14 of IC503 through a 4.7pF cap into a 1 megaohm input impedance counter.

Is frequency 10.240 MHz ±100 Hz — no → Ref Osc problem: Bad crystal; bad Ref Osc aboard IC503; cap values changed.

yes

Connect a scope to Pin 6 of IC503; observe waveform and compare with Figure 1 below.

Correct waveform — no → Prescaler output OK (Figure 2) — yes → Dual modulus control failure: Check voltages around IC503; possible IC failure

Prescaler output OK (Figure 2) — no → VCO or prescaler failure: Check voltages around prescaler IC201, Q203, and Q202.

yes

Check Synth Frequency Signature — OK → Synth chip counter failure: Check voltage around IC503; defective IC503.

not OK → Microprocessor or memory failure

FIGURE 1

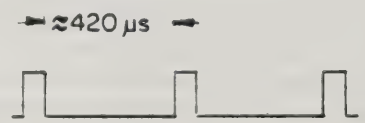
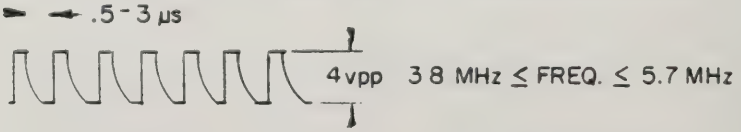
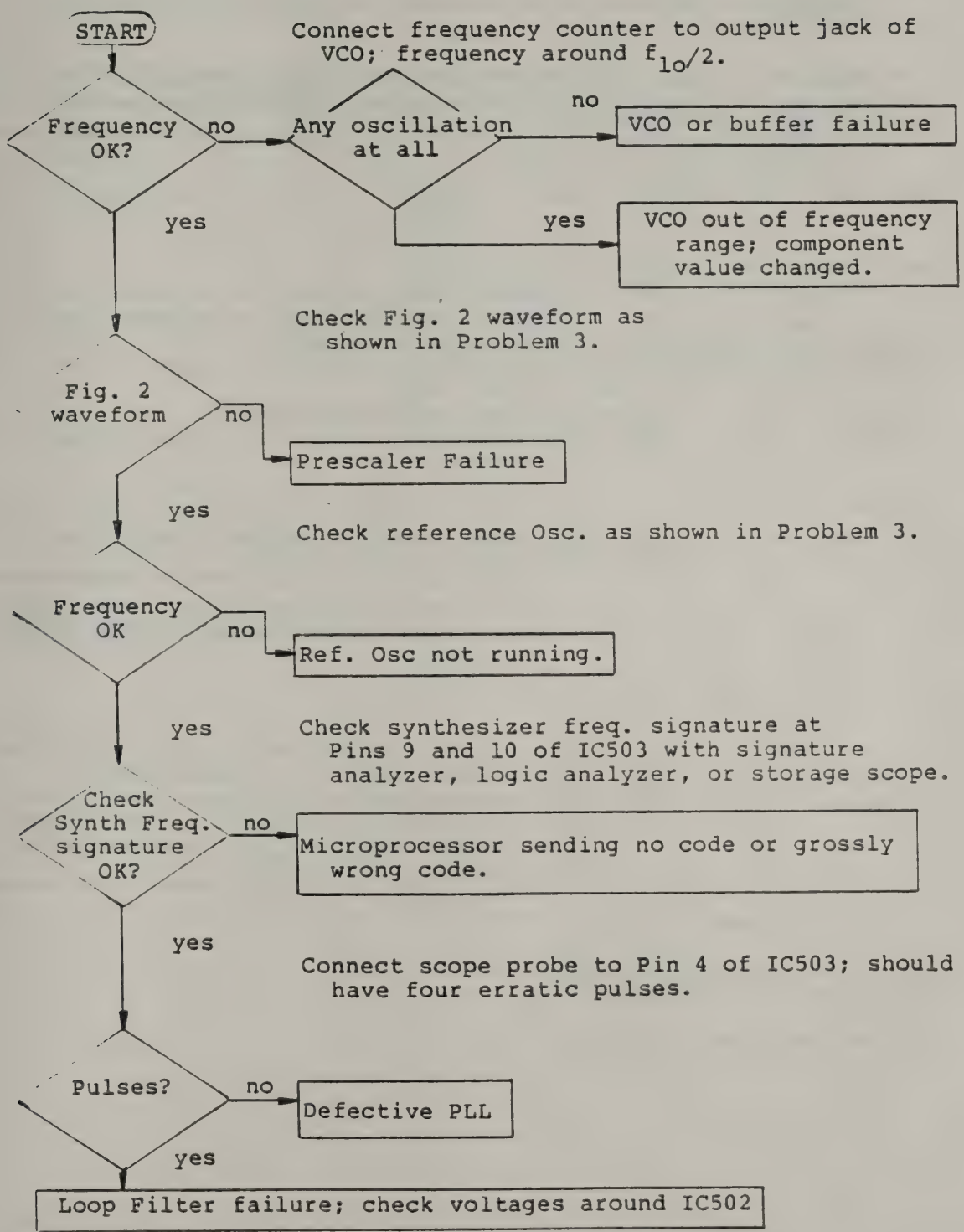


FIGURE 2

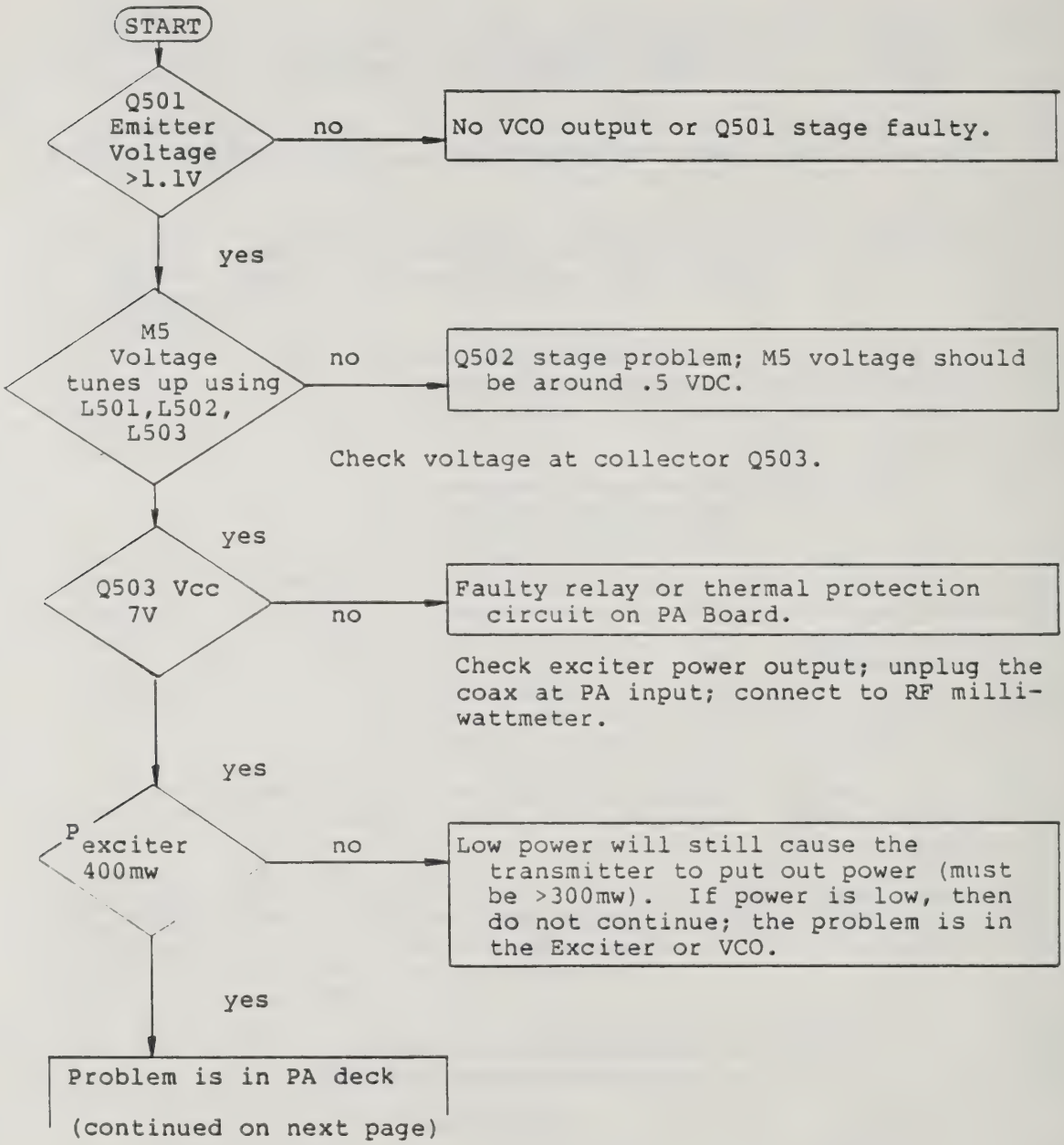


0300-4399-000

PROBLEM 4 - SYNTHESIZER LOOP WILL NOT LOCK



PROBLEM 5 - NO TRANSMIT POWER



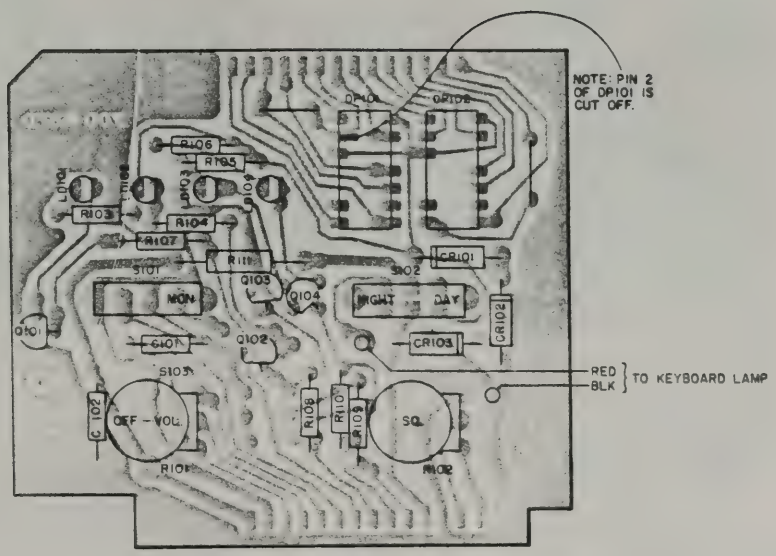
PROBLEM 5 - NO TRANSMIT POWER (Continued)

Keying the radio and measuring total current will give an indication of where the trouble in the PA might be found.

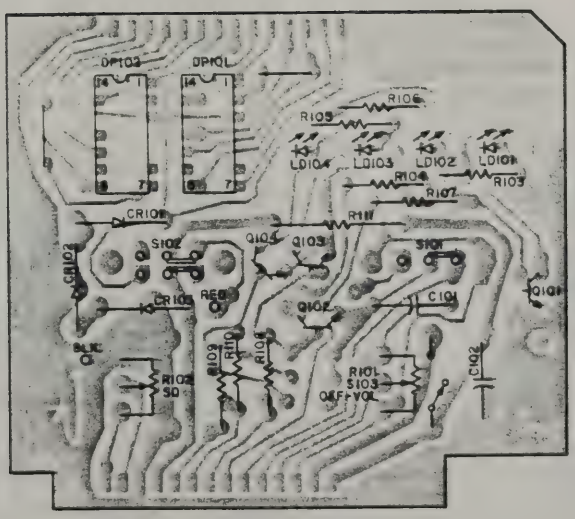
The following suggests possible problem areas for several current ranges (assuming zero output power).

Current	Possible Problem Area
8A or more	Q303 output circuit or T-R switch circuit
3-5A	Q301 and Q302 probably OK - possible bad Q303 or its input matching circuit
1-3A	Q301 circuit probably OK - possible bad Q302 or its input circuit
1A or less	Possible bad Q301 or input matching circuit

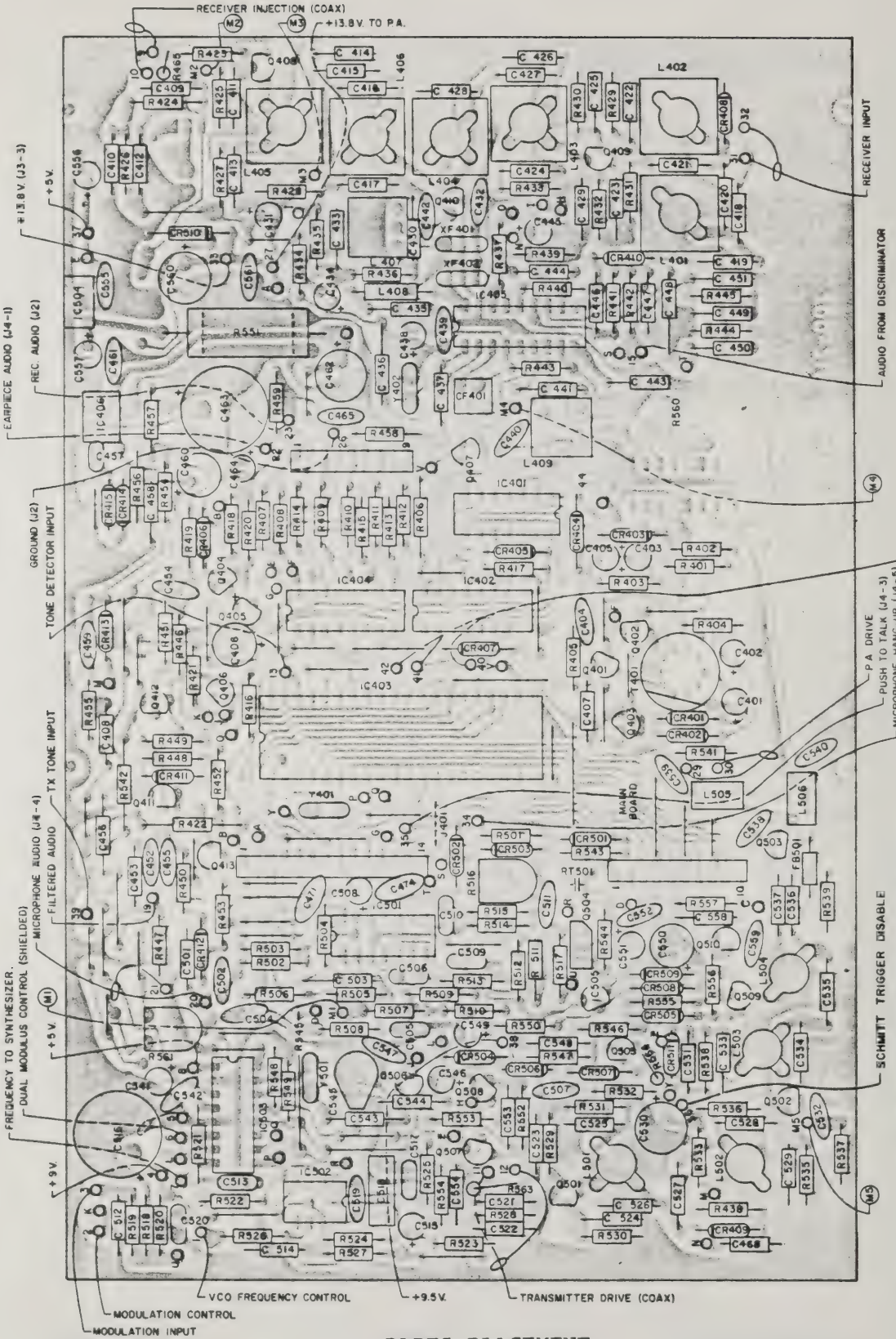
2-6-3 Control Board



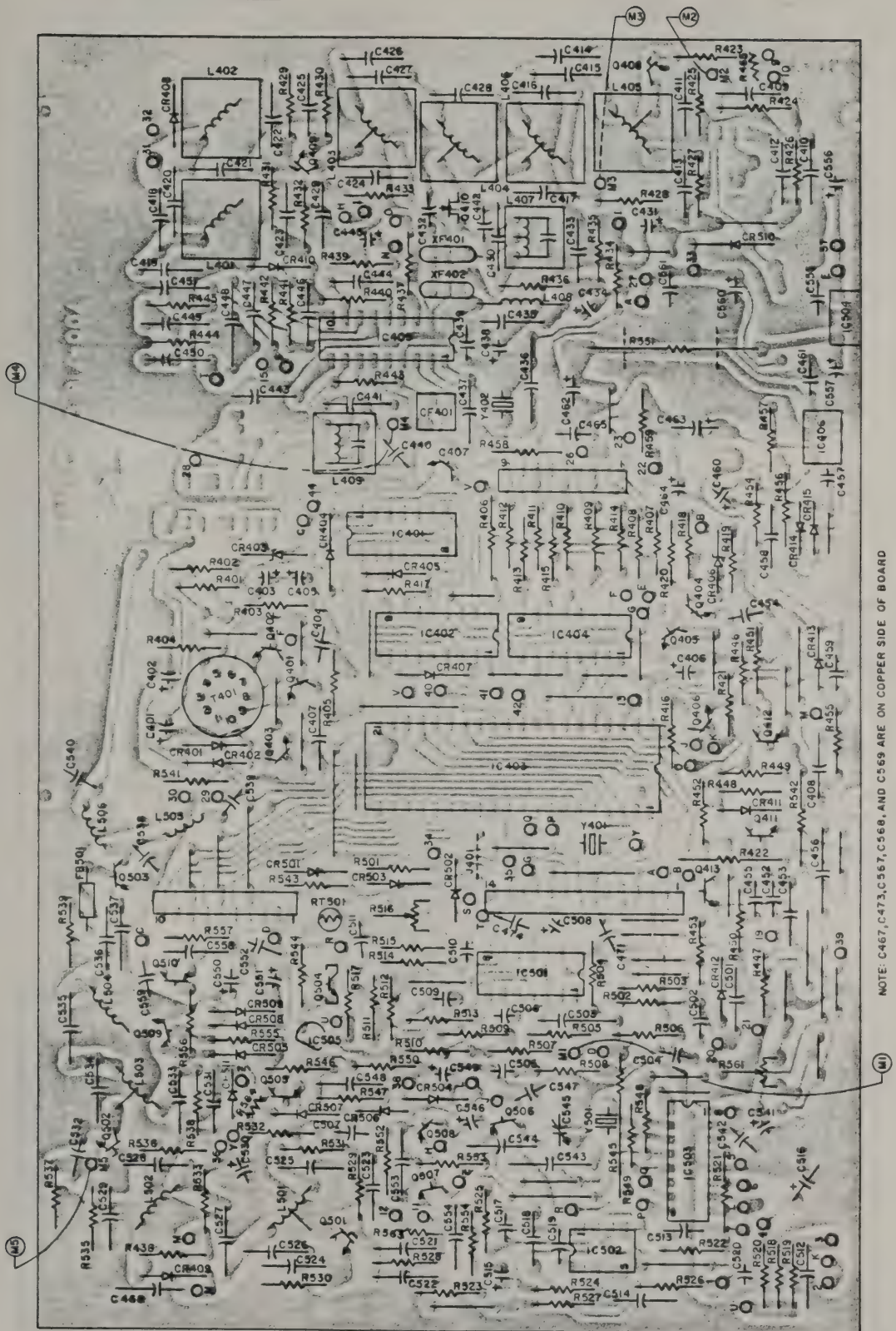
PARTS PLACEMENT



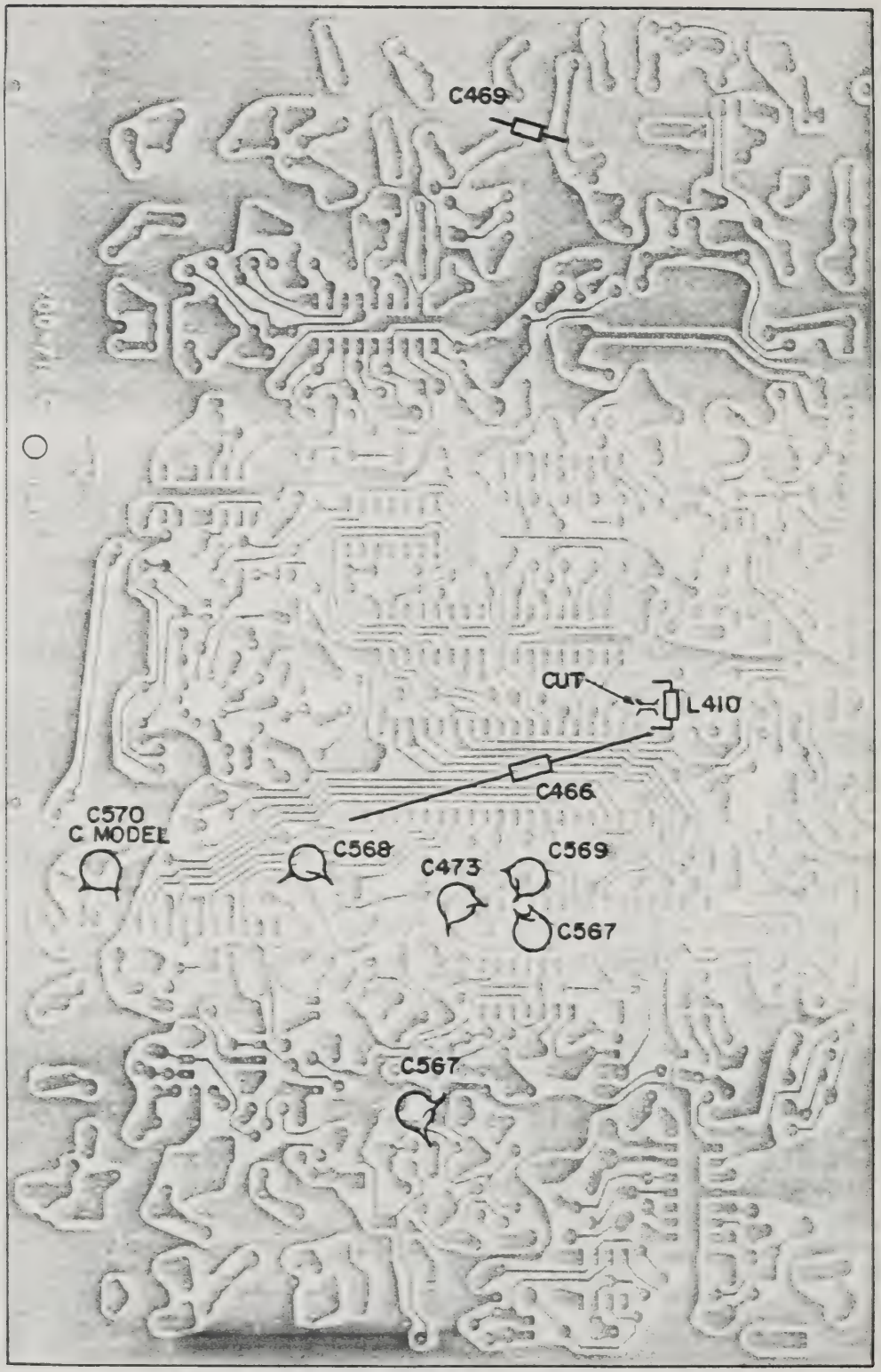
PARTS OVERLAY



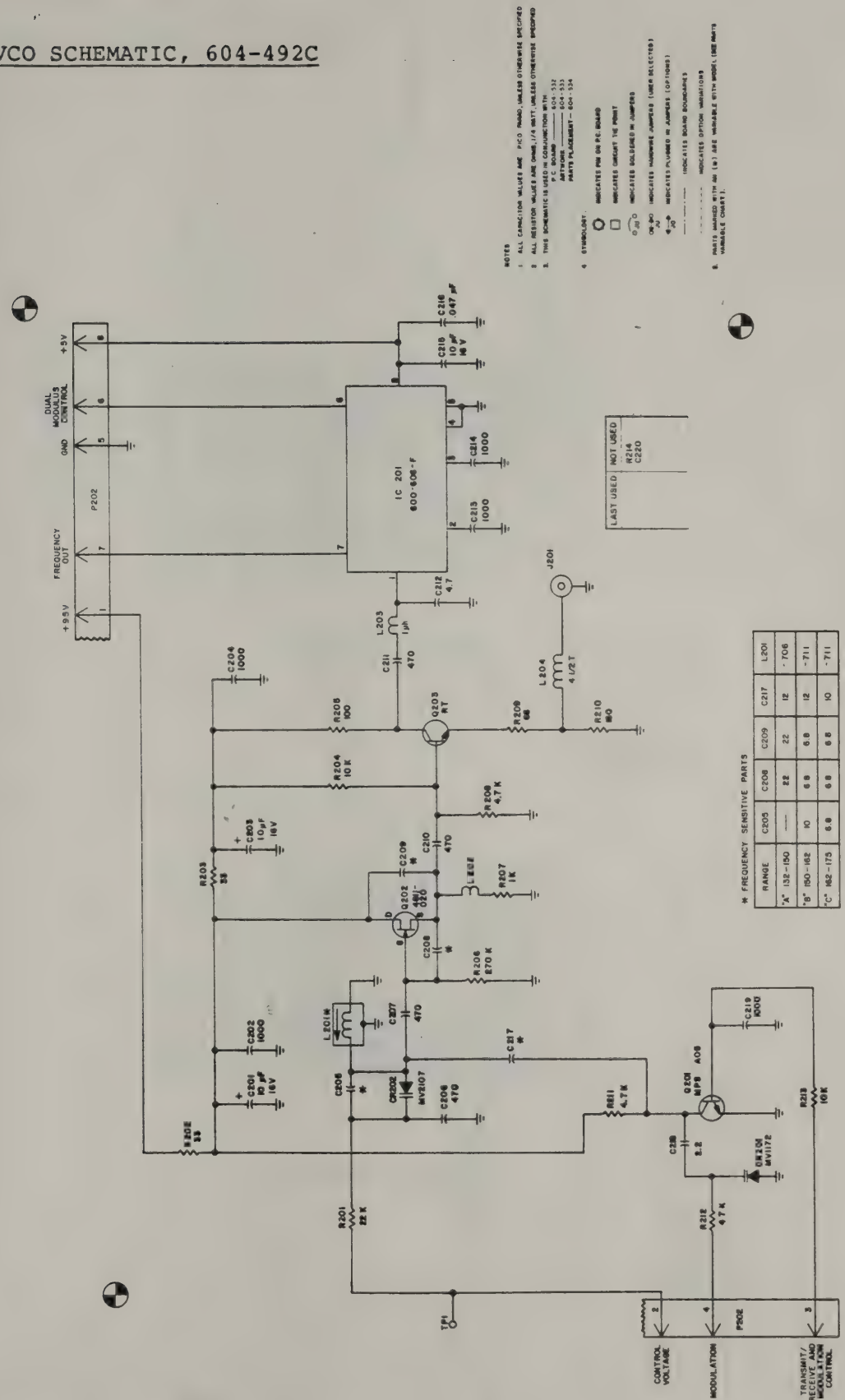
PARTS PLACEMENT



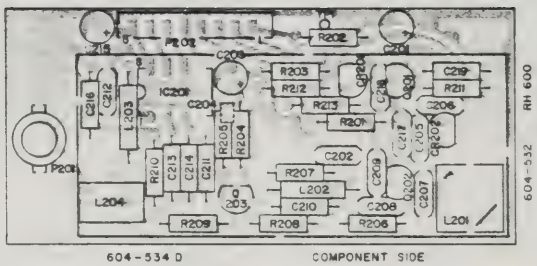
PARTS OVERLAY



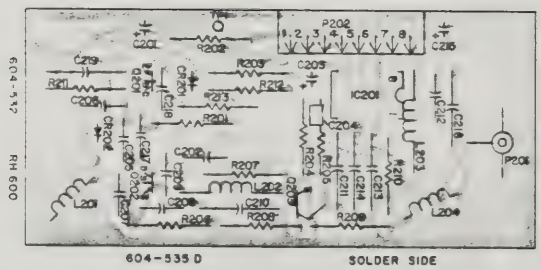
PARTS PLACEMENT, BOTTOM SIDE


NOTES
1. ALL CAPACITOR VALUES ARE PICO FARAD, UNLESS OTHERWISE SPECIFIED
2. ALL RESISTOR VALUES ARE OHMS, 1/4 WATT, UNLESS OTHERWISE SPECIFIED
3. THIS SCHEMATIC IS USED IN CONJUNCTION WITH
P.C. BOARD ——— 604-332
ARTWORK ——— 604-333
PARTS PLACEMENT — 604-334
4. SYMBOLOGY:
INDICATES PIN ON P.C. BOARD
INDICATES CIRCUIT TEST POINT
INDICATES SOLDERED IN JUMPERS
ON-NO INDICATES HARDWIRE JUMPER (USER SELECTED)
INDICATES PLUGGED IN JUMPER (OPTIONS)
INDICATES BOARD BOUNDARIES
INDICATES OPTION VARIATIONS
5. PARTS MARKED WITH AN (*) ARE VARIABLE WITH MODEL (SEE PARTS VARIABLE CHART).
LAST USED
NOT USED
R214
C220
* FREQUENCY SENSITIVE PARTS
RANGE | C205 | C208 | C209 | C217 | L201
"A" 132-150 | —— | 22 | 22 | 12 | -706
"B" 150-162 | 10 | 6.8 | 6.8 | 12 | -711
"C" 162-175 | 6.8 | 6.8 | 6.8 | 10 | -711
DUAL MODULUS CONTROL
FREQUENCY OUT
+5V
+9.5V
GND
P202
IC 201
600-606-F
C216 .047 μF
C218 10 μF 16V
C214 1000
C215 1000
C212 4.7
L203 1μH
C211 470
J201
L204 4 1/2 T
C204 1000
R208 100
Q203 RT
R209 68
R210 80
R204 10 K
R205 4.7 K
C203 10 μF 16V
R203 33
C209 *
C210 470
L202
R207 1K
Q202 MPF 102
C208 *
R206 270 K
L201 M
C207 470
C202 1000
C201 10 μF 16V
C205 *
CR202 MV2107
C206 470
C217 *
R202 33
R211 4.7K
Q201 MPS A06
C219 1000
R213 10K
C238 2.2
CR201 MV1172
R201 22 K
R212 47 K
TP1
P202
CONTROL VOLTAGE
MODULATION
TRANSMIT/ RECEIVE AND MODULATION CONTROL

2-6-8 VCO BOARD

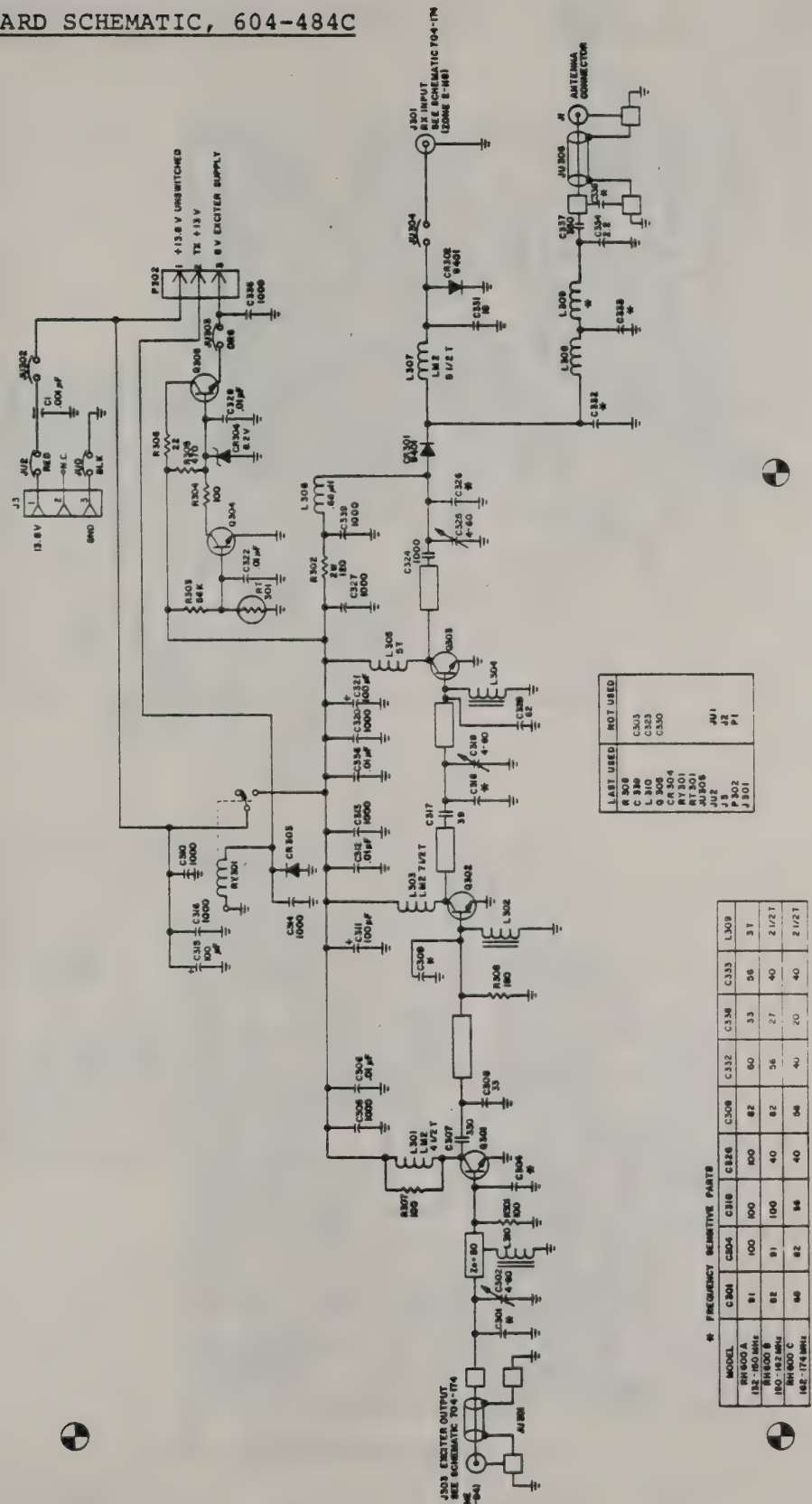


PARTS PLACEMENT



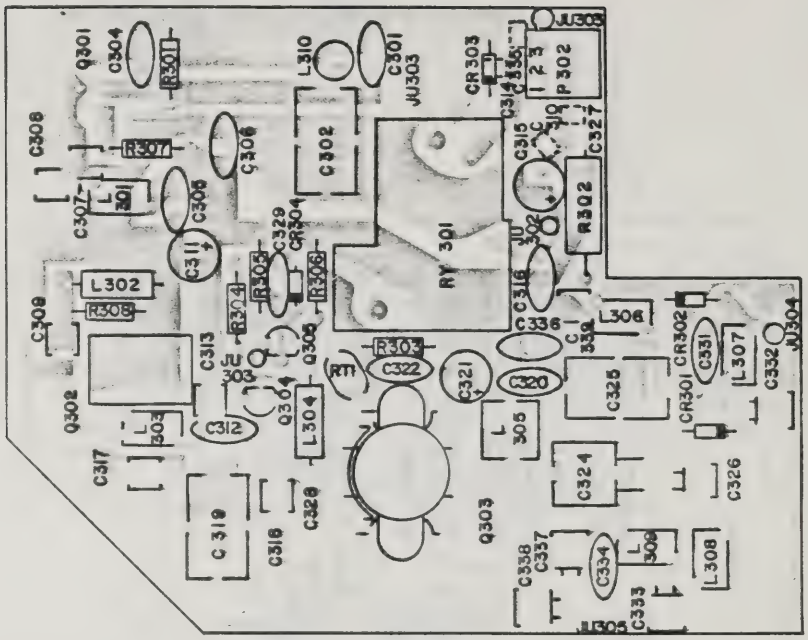
PARTS OVERLAY

PA BOARD SCHEMATIC, 604-484C

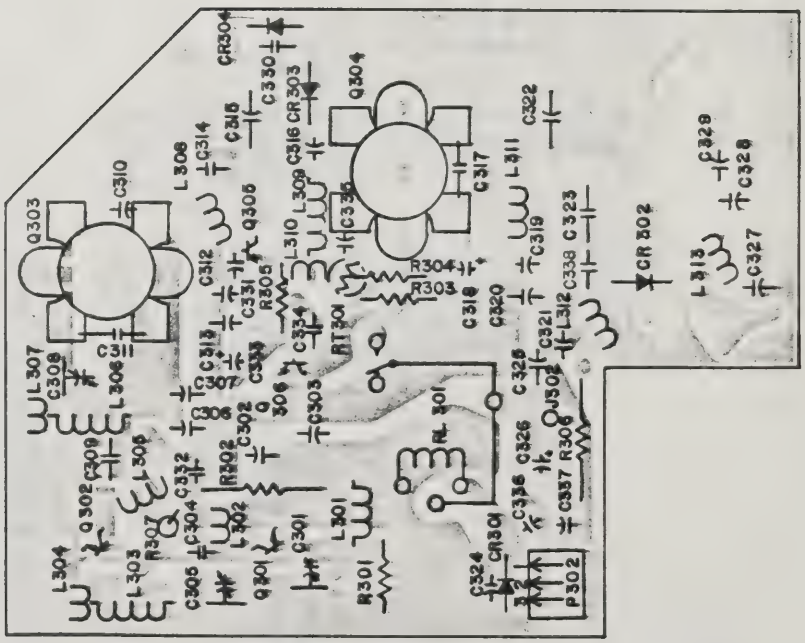


* FREQUENCY DEPENDENT PARTS

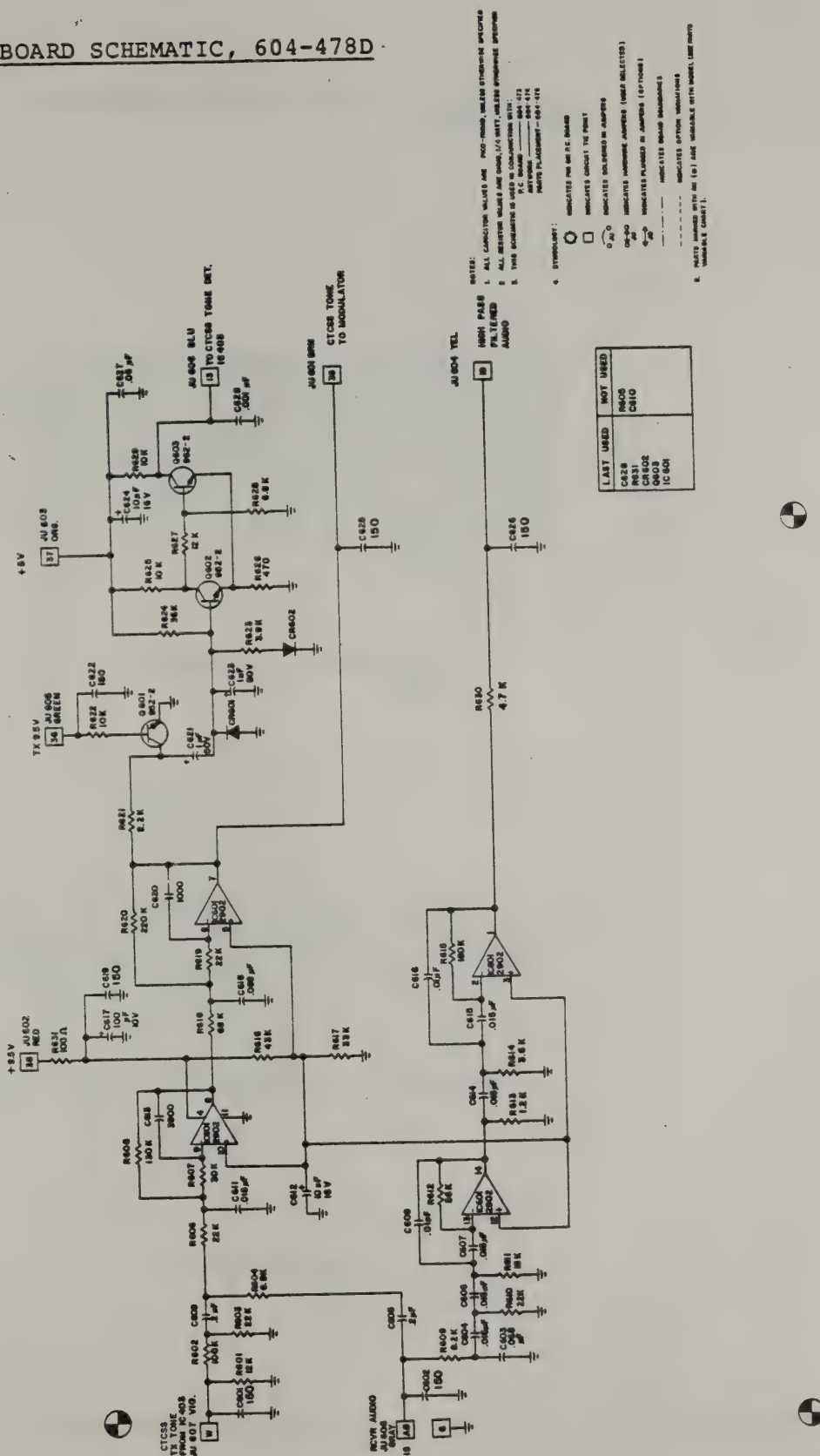
MODEL	C304	C310	C326	C329	C332	C334	C333	L309
RH600 A 132-150 MHz	100	100	100	82	60	33	56	3 T
RH600 B 150-162 MHz	100	100	40	82	56	27	40	2 1/2 T
RH600 C 162-174 MHz	82	56	40	56	40	20	40	2 1/2 T



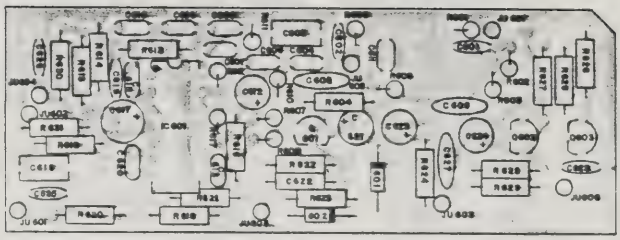
PARTS PLACEMENT



PARTS OVERLAY

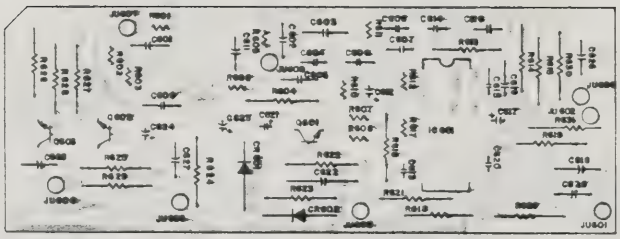


2-6-12 FILTER BOARD



604-478 D COMPONENT SIDE

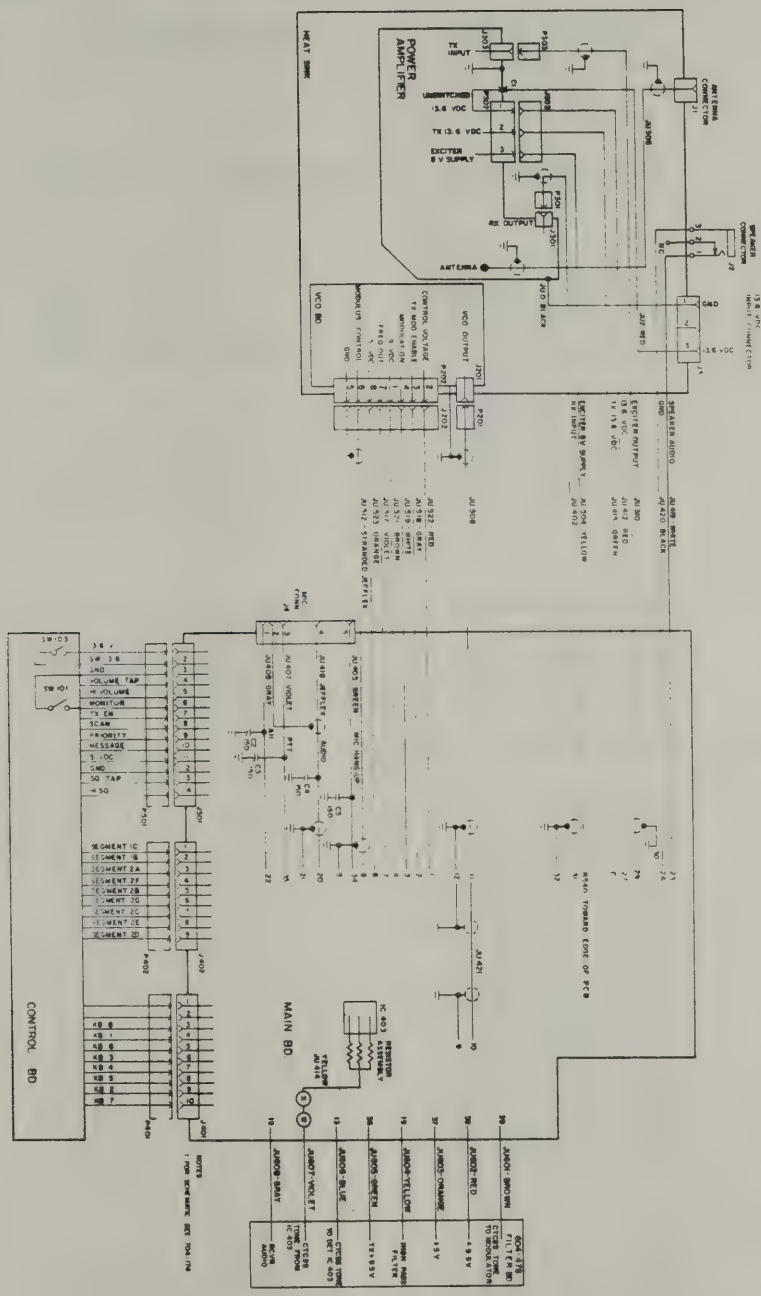
PARTS PLACEMENT



604-478 D SOLDER SIDE

PARTS OVERLAY

2-6-13 INTERCONNECTION DIAGRAM, 604-501B



SECTION 3 - PARTS LISTS

3-1 VCO BOARD

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
INTEGRATED CIRCUITS			
IC201	Prescaler 600-606-F	3130-6060-605	C3
TRANSISTORS			
Q201	MPS A05	4801-0000-005	A7
Q202	2N5245 FET (graded)	4811-0000-020	C6
Q203	SPS 1473 Red Top	4801-0000-035	C5
DIODES			
CR201	Varactor MV 1172	4809-0000-001	A7
CR202	Varactor MV 2107	4809-0000-011	C7
COILS			
L201	4 1/2T shielded coil	1800-5149-711	C6
L202	4.7 uH choke	1803-3268-211	B6
L203	1 uH choke	1803-3268-210	C4
L204	4 1/2T molded choke	1803-5125-902	B4
RESISTORS (All resistors are 1/4W, 5%, carbon film, in ohms.)			
R201	22K	4704-0223-032	C7
R202	33	4704-0330-032	D7
R203	33	4704-0330-032	C5
R204	10K	4704-0103-032	C5
R205	100	4704-0101-032	C5
R206	270K	4704-0274-032	B6
R207	1K	4704-0102-032	B6
R208	4.7K	4704-0472-032	B5
R209	68	4704-0680-032	B5
R210	180	4704-0181-032	B5
R211	4.7K	4704-0472-032	B7
R212	47K	4704-0473-032	A7
R213	10K	4704-0103-032	A7
CAPACITORS			
C201	10uF 16V Elect	1513-0100-002	C7
C202	1000pF Cer Disc	1523-0102-002	C6
C203	10uF 16V Elect	1513-0100-002	C5
*C204	1000pF NPO Chip Cap	1553-5237-703	C4

*Indicates that this part is mounted on the solder side of the PC Board.

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
C205	10pF NPO Cer Disc	1500-0100-650	C7
C206	470pF Cer Disc	1523-0471-002	B7
C207	470pF Cer Disc	1523-0471-002	C6
C208	6.8pF NPO Cer Disc	1500-0689-505	C6
C209	6.8pF NPO Cer Disc	1500-0689-505	C5
C210	470pF Tubular Cer	1538-0471-601	C5
C211	470pF Tubular Cer	1538-0471-601	C4
C212	4.7pF NPO Cer Disc	1500-0479-905	B4
C213	1000pF Tubular Cer	1538-0102-601	B4
C214	1000pF Tubular Cer	1538-0102-601	B3
C215	10uF 16V Elect	1513-0100-002	B3
C216	.047uF Tubular Mono	1539-0473-708	B2
C217	12pF NPO Cer Disc	1500-0120-605	B6
C218	2.2pF NPO Cer Disc	1500-0229-205	A7
C219	1000pF Tubular Cer	1538-0102-601	A6

3-2 CONTROL BOARD

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
CAPACITORS			
C101	1000pF, Tubular Cer	1538-0102-601	2-F3
C102	.01uF, Tubular Cer	1538-0103-804	1-H4
DIODES			
CR101	1N4002	4806-0000-004	1-G8
CR102	1N4002	4806-0000-004	1-G8
CR103	1N4002	4806-0000-004	1-G8
DISPLAYS			
DS101	7-Segment LED	2000-3285-600	1-D8
DS102	7-Segment LED	2000-3285-600	1-D7
LD101	LED, red	4810-1333-801	1-H8
LD102	LED, yellow	4810-1320-501	1-H8
LD103	LED, yellow	4810-1320-501	1-G8
LD104	LED, yellow	4810-1320-501	1-G8
TRANSISTORS			
Q101	SPS 952-2	4801-0000-016	1-H8
Q102	SPS 952-2	4801-0000-016	1-H8
Q103	SPS 952-2	4801-0000-016	1-G8
Q104	SPS 952-2	4801-0000-016	1-G8
RESISTORS (All resistors are in ohms, 1/4W, 5%, carbon film, unless otherwise indicated.)			
R101	Var., 10K Vol. w/Sw. 103	4750-5194-701	2-F3
R102	Var., 10K, Squelch	4750-5194-601	2-G4
R103	100	4704-0101-032	1-H8
R104	100	4704-0101-032	1-H8
R105	100	4704-0101-032	1-G8
R106	100	4704-0101-032	1-G8
R107	10K	4704-0103-032	1-H8
R108	4700	4704-0472-032	1-H8
R109	4700	4704-0472-032	1-G8
R110	4700	4704-0472-032	1-G8
R111	56, 1W, 10% WW	4711-0560-049	1-F8
SWITCHES			
SW101	Slide, SPDT, Monitor	5113-5154-001	1-E8
SW102	Slide, DPDT, Day/Night	5113-5152-301	1-F8
SW103	Part of R101		1-H4

3-3 FILTER BOARD

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
INTEGRATED CIRCUITS			
IC601	Quad Op Amp LM 2902	3130-3157-637	C7
TRANSISTORS			
Q601	SPS 952-2	4801-0000-016	D5
Q602	SPS 952-2	4801-0000-016	C4
Q603	SPS 952-2	4801-0000-016	C3
DIODES			
CR601	Silicon 1N4148	4805-1241-200	C5
CR602	Silicon 1N4148	4805-1241-200	C4
RESISTORS (All resistors are 1/4W, 5%, carbon film, in ohms.)			
R601	12K	4704-0123-032	C8
R602	100K	4704-0104-032	C8
R603	22K	4704-0223-032	C8
R604	6.8K	4704-0682-032	C7
R605	Not used		
R606	22K	4704-0223-032	C7
R607	30K	4704-0303-032	C7
R608	130K	4704-0134-032	D7
R609	8.2K	4704-0822-032	B8
R610	22K	4704-0223-032	B8
R611	15K	4704-0153-032	B7
R612	56K	4704-0563-032	B7
R613	1.2K	4704-0122-032	B7
R614	3.6K	4704-0362-032	B6
R615	150K	4704-0154-032	B6
R616	43K	4704-0433-032	C6
R617	33K	4704-0333-032	C6
R618	68K	4704-0683-032	C6
R619	22K	4704-0223-032	C6
R620	220K	4704-0224-032	D6
R621	2.2K	4704-0222-032	D5
R622	10K	4704-0103-032	D5
R623	3.9K	4704-0392-032	C4
R624	36K	4704-0363-032	D4
R625	10K	4704-0103-032	D4
R626	470	4704-0471-032	C4
R627	12K	4704-0123-032	C4
R628	6.8K	4704-0682-032	C3
R629	10K	4704-0103-032	D3
R630	4.7K	4704-0472-032	B4
R631	100	4704-0101-032	D6

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
CAPACITORS			
C601	150pF Cer Disc	1523-0151-002	C8
C602	150pF Cer Disc	1523-0151-002	C8
C603	.068uF Mylar	1508-0683-610	B8
C604	.015uF Mylar	1508-0153-510	B8
C605	.2uF Cer Disc	1502-0204-006	C8
C606	.015uF Mylar	1508-0153-510	B7
C607	.015uF Mylar	1508-0153-510	B7
C608	.01uF Mylar	1508-0103-510	C7
C609	.2uF Cer Disc	1502-0204-006	C8
C610	Not used		
C611	.015uF Mylar	1508-0153-510	C7
C612	10uF 16V Elect	1513-0100-002	C7
C613	3900pF Mylar	1508-0392-510	D7
C614	.015uF Mylar	1508-0153-510	B6
C615	.015uF Mylar	1508-0153-510	B6
C616	.01uF Mylar	1508-0103-510	C6
C617	100uF 10V Elect	1513-3254-742	D6
C618	.068uF Mylar	1508-0683-610	C6
C619	150pF Cer Disc	1523-0151-002	D6
C620	1000pF Mylar	1508-0102-510	D5
C621	1uF 50V Elect	1513-0010-004	C5
C622	150pF Tubular Cer	1538-0151-601	D4
C623	1uF 50V Elect	1513-0010-004	C4
C624	10uF 16V Elect	1513-0100-002	D3
C625	150pF Cer Disc	1523-0151-002	C4
C626	150pF Cer Disc	1523-0151-002	B4
C627	.05uF Cer Disc	1502-0503-003	D3
C628	.001uF Cer Disc	1523-0102-002	C3

3-4 PA BOARD

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
TRANSISTORS			
Q301	MRF 237	4804-3169-608	B7
Q302	MRF 261	4804-3411-805	C5
Q303	MRF 245	4804-3269-801	C4
Q304	MPS A05	4801-0000-005	C3
Q305	MPS A05	4801-0000-005	D3
DIODES			
CR301	PIN 9401	4815-3408-601	C3
CR302	PIN 9401	4815-3408-601	C2
CR303	1N4148	4805-1241-200	C5
CR304	Zener 8.2V	4808-0000-027	C3
COILS			
L301	4 1/2T molded choke	1803-5125-902	C7
L302	1 1/2T ferrite choke	2502-0000-002	B5
L303	7 1/2T molded choke	1803-5125-913	C5
L304	1 1/2T ferrite choke	2502-0000-002	B4
L305	5T Air wound	1803-3269-000	C4
L306	.66 uH molded choke	1803-5125-911	C3
L307	5 1/2T molded choke	1803-5125-905	C2
L308	2 1/2T Air wound	1801-3407-702	B2
L309	2 1/2T Air wound	1801-3407-702	B2
L310	2T ferrite choke	2502-3254-101	B7
THERMISTOR			
RT301	Thermistor	5300-0000-004	C4
RELAYS			
RY301	Relay SPST 30A	4500-5476-700	C5
RESISTORS (All resistor values are in ohms.)			
R301	100 carbon comp 1/4W 10%	4700-0101-042	B7
R302	120 WW 2W 5%	4710-0121-031	C4
R303	56K carbon film 1/4W 5%	4704-0563-032	D4
R304	100 carbon comp 1/4W 10%	4700-0101-042	C3
R305	470 carbon film 1/4W 5%	4704-0471-032	D3
R306	22 carbon film 1/4W 5%	4704-0220-032	D3
R307	100 carbon comp 1/4W 10%	4700-0101-042	C7
R308	180 carbon film 1/4W 5%	4704-0181-032	B6

3-4 PA BOARD (continued)

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
CAPACITORS			
C301	82pF NPO Cer Disc	1524-0820-002	B7
C302	4-60pF Mica Trimmer	1517-0000-002	B7
C303	Not used		
C304	91pF NPO Cer Disc	1500-0910-550	B7
C305	1000pF Cer Disc	1503-0102-001	C6
C306	.01uF Cer Disc	1503-0103-007	C6
C307	330pF Cer Chip	1540-0331-606	C6
C308	33pF Cer Chip	1540-0330-605	B6
C309	82pF Cer Chip	1540-0820-605	C6
*C310	1000pF NPO Cer Chip	1553-5237-703	D5
C311	100uF 16V Elect	1513-0101-002	C5
C312	.01uF Cer Disc	1503-0103-007	C5
C313	1000pF NPO Cer Chip	1553-5237-703	C5
*C314	1000pF NPO Cer Chip	1553-5237-703	C5
C315	100uF 16V Elect	1513-0101-002	D6
C316	1000pF Cer Disc	1503-0102-001	D5
C317	39pF Cer Chip	1540-0390-605	C5
C318	100pF Cer Chip	1540-0101-606	B5
C319	4-60pF Mica Trimmer	1517-0000-002	B5
C320	1000pF Cer Disc	1503-0102-001	C4
C321	100uF 16V Elect	1513-0101-002	C4
C322	.01uF Cer Disc	1503-0103-007	C4
C323	Not used		
C324	1000pF Mica	1522-0102-002	C3
C325	4-60pF Mica Trimmer	1517-0000-002	C3
C326	40pF Mica	1522-0400-006	C3
*C327	1000pF NPO Cer Chip	1553-5237-703	C4
C328	62pF Mica	1522-5418-305	B4
C329	.01uF Cer Disc	1503-0103-007	C3
C330	Not used		
C331	18pF Cer Disc	1500-0180-505	B2
C332	56pF Mica	1522-0560-007	B3
C333	40pF Mica	1522-0400-006	B2
C334	2.2pF NPO Cer Disc	1500-0229-905	B2
*C335	1000pF NPO Cer Chip	1553-5237-703	C2
C336	.01uF Cer Disc	1503-0103-007	C5
C337	350pF Mica	1522-0351-007	B2
C338	27pF Mica	1522-0270-006	B2
C339	1000pF NPO Cer Chip	1553-5237-703	C3

*Indicates that this part is mounted on the solder side of the PC Board.

3-5 MAIN BOARD, RECEIVER SECTION

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
CAPACITORS	(All capacitors are in pF unless otherwise indicated.)		
C401	4.7uF, 50V, Lytic	1513-0050-004	1-G4
C402	4.7uF, 50V, Lytic	1513-0050-004	1-G4
C403	4.7uF, 35V, Lytic	1513-0479-006	1-E4
C404	.05uF, 16V	1502-0503-003	1-E5
C405	4.7uF, 35V, Lytic	1513-0479-006	1-E5
C406	100uF, 10V, Lytic	1513-3254-730	1-G5
C407	.01uF, 25V	1538-0103-804	1-E5
C408	2200, 50V, 10%	1538-0222-706	1-E5
C409	1000, 50V, 10%	1538-0102-601	2-F8
C410	.01uF, 25V	1538-0103-804	2-F8
C411	470, 50V, 10%	1538-0471-601	2-F7
C412	.01uF, 25V	1538-0103-804	2-G8
C413	470, 50V, 10%	1538-0471-601	2-F7
C414	6.8, 50V, 10%, NPO	1538-0689-608	2-F7
C415	.47, 10%	1510-0478-900	2-F7
C416	8.2, 50V, 10%,NPO	1538-0829-608	2-F7
C417	.01uF, 25V	1538-0103-804	2-F7
C418	2.2, 10%, NPO	1538-0229-608	2-H8
C419	5.6, 50V, 10%, NPO	1538-0569-608	2-G8
C420	.39, 10%	1510-0398-900	2-H8
C421	8.2, 50V, 10%, NPO	1538-0829-608	2-G8
C422	39, 50V, 5%	1538-0390-508	2-G8
C423	.01uF, 25V	1538-0103-804	2-H8
C424	470, 50V, 10%	1538-0471-601	2-H7
C425	470, 50V, 10%	1538-0471-601	2-G7
C426	6.8, 50V, 10%, NPO	1538-0689-608	2-G7
C427	.39, 10%	1510-0398-900	2-G7
C428	6.8, 50V, 10%, NPO	1538-0689-608	2-G7
C429	.01uF, 25V	1538-0103-804	2-H7
C430	.01uF, 25V	1538-0103-804	2-H6
C431	10uF, 16V, Lytic	1513-0100-002	2-H6
C432	3.9, 500V	1500-0399-205	2-G6
C433	.01uF, 25V	1538-0103-804	2-H7
C434	10uF, 16V, Lytic	1513-0100-002	2-H7
C435	.01uF, 25V	1538-0103-804	2-G6
C436	68, 50V, 5%, NPO	1538-0680-509	2-H5
C437	150, 50V, 10%	1538-0151-601	2-H5
C438	22uF, 16V, Lytic	1512-0220-002	2-H6
C439	.05uF, 16V	1502-0503-003	2-H6
C440	.05uF, 16V	1502-0503-003	2-H5
C441	.047uF, 50V	1539-0473-708	2-H5
C442	3.9, 500V	1500-0399-205	2-G6
C443	150, 50V, 10%	1538-0151-601	2-G5
C444	1000, 50V, 10%	1538-0102-601	2-G5
C445	.47uF, 50V, Lytic	1513-3302-005	2-G5
C446	4700, 50V, 10%	1538-0472-626	2-G5

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
C447	1000, 50V, 10%	1538-0102-601	2-G4
C448	82, 50V, 5%	1538-0820-517	2-G5
C449	1000, 50V, 10%	1538-0102-601	2-G4
C450	1000, 50V, 10%	1538-0102-601	2-G4
C451	1000, 50V, 10%	1538-0102-601	2-G4
C452	.2uF, 12V	1502-0204-006	2-G3
C453	2200, 50V, 10%	1538-0222-706	2-G3
C454	.2uF, 12V	1502-0204-006	2-F4
C455	.2uF, 12V	1502-0204-006	2-G3
C456	.022uF, 25V	1538-0223-805	2-F2
C457	2200, 100V, 5%, Mylar	1508-0222-510	2-F2
C458	.01uF, 25V	1538-0103-804	2-E2
C459	.1uF, 12V	1502-0104-005	2-E2
C460	100uF, 10V, Lytic	1513-3254-730	2-E2
C461	.05uF, 25V	1502-0503-004	2-F2
C462	220uF, 16V, Lytic	1513-3254-711	1-F2
C463	1000uF, 16V, Lytic	1513-3254-704	2-F2
C464	.47uF, 50V, Lytic	1513-3302-005	2-F2
C465	.1uF, 12V	1502-0104-005	2-F2
*C466	.1uF, 50V	1539-0104-908	1-G5
*C467	470, 50V	1523-0471-002	1-G7
C468	470, 50V	1538-0471-601	2-F5
*C469	1000, 50V	1523-0102-002	2-F7
C470	47uF, 10V, Lytic	1513-3254-727	1-D4
C471	150, 50V	1523-0151-002	1-H7
C472	Not used		
*C473	150, 50V	1523-0151-002	2-G4
C474	150, 50V	1523-0151-002	2-F4
FILTERS			
CF401	Ceramic, 455 KHz	2700-3209-500	2-H5
DIODES			
CR401	Silicon	4805-1241-200	1-G4
CR402	Silicon	4805-1241-200	1-G4
CR403	36V, Zener, 5%	4808-0000-053	1-G4
CR404	Silicon	4805-1241-200	1-G5
CR405	Silicon	4805-1241-200	1-F5
CR406	Not used		
CR407	Germanium	4807-1233-900	1-F5
CR408	Silicon	4805-1241-200	2-G8
CR409	Silicon	4805-1241-200	2-F5
CR410	Silicon	4805-1241-200	2-F5
CR411	Germanium	4807-1233-900	2-F3
CR412	Germanium	4807-1233-900	2-F3
CR413	Silicon	4805-1241-200	2-E2

*Indicates that this part is mounted on the solder side of the PC Board.

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM ZONE
CR414	Silicon	4805-1241-200	2-E2
CR415	Silicon	4805-1241-200	2-E2
INTEGRATED CIRCUITS			
IC401	EAROM, Memory	3130-3157-663	1-F4
IC402	Memory Buffer	3130-3193-533	1-F5
IC403	Microprocessor	3130-6060-316	1-E6
IC404	BCD to 7-Segment Driver	3130-3193-531	1-D7
IC405	IF Amp, Second Mixer, Det	3130-6056-500	2-H5
IC406	Audio Amp	3130-5407-602	2-F2
COILS/CHOKES			
L401	Coil, Orange, 4 1/2T	1800-3152-020	2-G8
L402	Coil, Orange 4 1/2T	1800-3152-020	2-G8
L403	Coil, Pink, 4 1/2T	1800-3152-036	2-G7
L404	Coil, Green, 4 1/2T	1800-3152-037	2-G7
L405	Coil, Green, 4 1/2T	1800-3152-037	2-F7
L406	Coil, Green, 4 1/2T	1800-3152-037	2-F7
L407	Coil, 10.7 MHz	1800-6055-902	2-G6
L408	Choke, 39 uH	1803-3268-201	2-G6
L409	Coil, 455 KHz	1800-6055-801	2-H4
*L410	Choke, 4.7 uH	1803-3268-211	1-G5
TRANSISTORS			
Q401	NPN	4801-0000-005	1-G4
Q402	NPN	4801-0000-005	1-F4
Q403	NPN	4801-0000-005	1-E4
Q404	Not used		1-D5
Q405	Not used		1-D5
Q406	NPN	4801-0000-016	1-C5
Q407	NPN	4801-0000-016	1-C7
Q408	NPN, Red Top	4801-0000-035	2-F8
Q409	NPN, Red Top	4801-0000-035	2-G7
Q410	JFET	4811-0000-030	2-G6
Q411	NPN	4801-0000-016	2-F3
Q412	PNP, White Top	4801-0000-060	2-F4
Q413	NPN	4801-0000-005	2-F3

*Indicates that this part is mounted on the solder side of the PC Board.

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM ZONE
RESISTORS	(All resistors are in ohms, 1/4W, 5%, unless otherwise indicated.)		
R401	390	4704-0391-032	1-G4
R402	1200	4704-0122-032	1-G4
R403	1000	4704-0102-032	1-E4
R404	820	4704-0821-032	1-E4
R405	4700	4704-0472-032	1-E5
R406	4700	4704-0472-032	1-C6
R407	100	4704-0101-032	1-C7
R408	100	4704-0101-032	1-C7
R409	100	4704-0101-032	1-D7
R410	100	4704-0101-032	1-D7
R411	100	4704-0101-032	1-D7
R412	100	4704-0101-032	1-D7
R413	100	4704-0101-032	1-D7
R414	100	4704-0101-032	1-C7
R415	100	4704-0101-032	1-C7
R416	22K	4704-0223-032	1-C5
R417	15K	4704-0153-032	1-F5
R418	Not used		1-D5
R419	Not used		1-D5
R420	Not used		1-D5
R421	4700	4704-0472-032	1-C5
R422	1000	4704-0102-032	1-F5
R423	2700	4704-0272-032	2-F8
R424	8200	4704-0822-032	2-F8
R425	390	4704-0391-032	2-F8
R426	100	4704-0101-032	2-G8
R427	100	4704-0101-032	2-G7
R428	1000	4704-0102-032	2-F7
R429	8200	4704-0822-032	2-G8
R430	680	4704-0681-032	2-G7
R431	8200	4704-0822-032	2-H7
R432	100	4704-0101-032	2-H7
R433	100	4704-0101-032	2-H7
R434	100	4704-0101-032	2-H6
R435	100	4704-0101-032	2-H7
R436	470	4704-0471-032	2-H6
R437	100	4704-0101-032	2-G5
R438	2200	4704-0222-032	2-E5
R439	180K	4704-0184-032	2-G5
R440	47K	4704-0473-032	2-G5
R441	330K	4704-0334-032	2-G5
R442	1000	4704-0102-032	2-G4
R443	68K	4704-0683-032	2-H4
R444	13K	4704-0133-032	2-G4
R445	13K	4704-0133-032	2-G4
R446	1200	4704-0122-032	2-F4
R447	8200	4704-0822-032	2-G4
R448	10K	4704-0103-032	2-F3

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
R449	4700	4704-0472-032	2-F3
R450	68K	4704-0683-032	2-G3
R451	4700	4704-0472-032	2-F4
R452	2700	4704-0272-032	2-F3
R453	4700	4704-0472-032	2-F3
R454	36K	4704-0363-032	2-F2
R455	1200	4704-0122-032	2-E2
R456	2.7	4704-0279-032	2-E2
R457	180 1/2W	4704-0181-034	2-F2
R458	1	4704-0109-032	2-E2
R459	680	4704-0681-032	2-F2
R460	Not used		
R461	24K	4704-0243-032	1-G5
R462	16K	4704-0163-032	1-G5
R463	56K	4704-0563-032	1-G5
R464	Not used		
R465	470	4704-0471-032	2-F8
TRANSFORMER			
T401	Drum/Ring	5604-5151-200	1-F4
CRYSTAL FILTERS			
XF401	10.7 MHz	2705-3232-200	2-G6
XF402	10.7 MHz	(matched pair)	2-G6
CRYSTALS			
Y401	3.579 MHz	2342-3284-400	1-G7
Y402	10.245 MHz	2301-3151-601	2-H5

3-6 MAIN BOARD, TRANSMITTER

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
CAPACITORS (All capacitors are in pF unless otherwise			
C501	150, 50V, 10%	1538-0151-601	1-A6
C502	.015uF, 100V, 5%, Mylar	1508-0153-510	1-B6
C503	.022uF, 25V	1538-0223-805	1-C5
C504	.2uF, 12V	1502-0204-006	1-C4
C505	.015uF, 100V, 5%, Mylar	1508-0153-510	1-C4
C506	4700, 100V, 5%, Mylar	1508-0472-510	1-C4
C507	470, 50V	1523-0471-002	1-B4
C508	10uF, 16V, Lytic	1513-0100-002	1-B4
C509	.015uF, 100V, 5%, Mylar	1508-0153-510	1-B4
C510	1000, 100V, 5%, Mylar	1508-0102-510	1-C3
C511	.2uF, 12V	1502-0204-006	1-C3
C512	470, 50V, 10%	1538-0471-601	1-C3
C513	1000, 500V	1503-0102-001	1-D4
C514	470, 50V, 10%	1538-0471-601	1-C3
C515	10uF, 16V, Lytic	1513-0100-002	1-C4
C516	1000uF, 16V, Lytic	1513-3254-704	1-D4
C517	.015uF, 100V, 5%, Mylar	1508-0153-510	1-D4
C518	.22uF, Mylar	1508-3300-302	1-D4
C519	470, 50V	1523-0471-002	1-C4
C520	.015uF, 100V, 5%, Mylar	1508-0153-510	1-C3
C521	470, 50V, 10%	1538-0471-601	2-D8
C522	6.8, 50V, 10%, NPO	1538-0689-608	2-D8
C523	470, 50V, 10%	1538-0471-601	2-C8
C524	470, 50V, 10%	1538-0471-601	2-D7
C525	470, 50V, 10%	1538-0471-601	2-C7
C526	3.3, 50V, 10%, NPO	1538-0339-608	2-D7
C527	.39, 10%	1510-0398-900	2-D7
C528	6.8, 50V, 10%, NPO	1538-0689-608	2-D7
C529	3.9, 50V, 10%, NPO	1538-0399-608	2-D7
C530	100uF, 16V, Lytic	1513-0101-002	2-C7
C531	1000, 50V, 10%	1538-0102-601	2-C6
C532	470, 50V	1523-0471-002	2-D6
C533	470, 50V, 10%	1538-0471-601	2-D6
C534	6.8, 50V, 10%, NPO	1538-0689-608	2-D6
C535	.47, 10%	1510-0478-900	2-D6
C536	6.8, 50V, 10%, NPO	1538-0689-608	2-D5
C537	22, 50V, 5%, NPO	1538-0220-508	2-D5
C538	3.9, 50V, 5%, NPO	1500-0399-205	2-D5
C539	470, 50V	1523-0471-002	2-D5
C540	.05uF, 16V	1502-0503-003	2-D5
C541	47uF, 10V, Lytic	1513-3254-727	1-F2
C542	.05uF, 16V	1502-0503-003	1-G2
C543	56, 50V, 5%, NPO	1538-0560-509	1-F3
C544	27, 50V, 5%, NPO	1538-0270-508	1-F3
C545	3-12, Trimmer	1517-5165-001	1-F3
C546	4.7uF, 35V, Lytic	1513-0479-006	1-F2
C547	1000, 50V	1523-0102-002	1-F3

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
C548	1000, 50V, 10%	1538-0102-601	1-G3
C549	1uF, 50V, 10%, Lytic	1513-0010-004	1-G3
C550	470uF, 6.3V, Lytic	1513-3254-709	1-G2
C551	1uF, 50V, Lytic	1513-0010-004	1-H3
C552	1000, 50V	1523-0102-002	1-H4
C553	1000, 50V, 10%	1538-0102-601	1-G2
C554	1000, 50V, 10%	1538-0102-601	1-G2
C555	.05uF, 16V	1502-0503-003	1-H3
C556	10uF, 16V, Lytic	1513-0100-002	1-H3
C557	10uF, 16V, Lytic	1513-3302-004	1-H3
C558	1000, 50V, 10%	1538-0102-601	1-G3
C559	470, 50V	1523-0471-002	1-F4
C560	220uF, 16V, Lytic	1513-3254-711	1-H5
C561	470, 50V	1523-0471-002	1-H5
C562	Not used		
C563	Not used		
C564	Not used		
C565	Not used		
C566	Not used		
*C567	150, 50V	1523-0151-002	1-G3
*C568	150, 50V	1523-0151-002	1-C6
*C569	150, 50V	1523-0151-002	1-B6
*C570	Not used		2-D5
DIODES			
CR501	Silicon	4805-1241-200	1-C6
CR502	Silicon	4805-1241-200	1-C6
CR503	Germanium	4807-1233-900	1-C6
CR504	Germanium	4807-1233-900	1-F2
CR505	Silicon	4805-1241-200	1-G3
CR506	Silicon	4805-1241-200	1-G3
CR507	Silicon	4805-1241-200	1-G3
CR508	Silicon	4805-1241-200	1-G2
CR509	Silicon	4805-1241-200	1-G2
CR510	Silicon, 3 Amp	4806-0000-013	1-H5
CR511	Silicon	4805-1241-200	1-G3
FERRITE BEADS			
FB501	Ferrite Bead w/leads	2502-3293-901	2-D5

*Indicates part is mounted on the solder side of the PC Board.

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
INTEGRATED CIRCUITS			
IC501	Quad OP Amp	3130-3157-637	1-C5
IC502	Low Noise OP Amp	3130-5483-700	1-C4
IC503	CMOS Synthesizer	3130-6068-000	1-E3
IC504	5V Regulator, 1 Amp, 5%	3130-0000-022	1-H3
IC505	8V Regulator, 5%	3130-0000-021	1-G2
COILS			
L501	Coil, Yellow, 4 1/2T	1800-3152-035	2-D7
L502	Coil, Orange, 4 1/2T	1800-3152-020	2-D7
L503	Coil, Orange, 3 1/2T	1800-3152-034	2-D6
L504	Coil, Orange, 4 1/2T	1800-3152-020	2-D6
L505	Coil, Blue, 6 1/2 T	1803-5125-909	2-D5
L506	Coil, Natural, 10 1/2 T	1803-5125-912	2-D5
L507	Choke, 3.3 mH	1803-3268-212	1-D3
TRANSISTORS			
Q501	NPN, Red Top	4801-0000-035	2-D8
Q502	NPN, Red Top	4801-0000-035	2-D6
Q503	NPN, Pre-driver	4801-0000-030	2-D5
Q504	Darlington	4814-3449-700	1-F3
Q505	PNP, White Top	4801-0000-060	1-G3
Q506	NPN	4801-0000-016	1-F3
Q507	NPN	4801-0000-016	1-G2
Q508	PNP, White Top	4801-0000-060	1-G3
Q509	NPN	4801-0000-016	1-F3
Q510	PNP	4801-0000-001	1-G4
RESISTORS (All resistors are in ohms, 1/4W, 5%, unless otherwise indicated.)			
R501	470	4704-0471-032	1-C6
R502	36K	4704-0363-032	1-B6
R503	470K	4704-0474-032	1-C5
R504	30K	4704-0303-032	1-C5
R505	330K	4704-0334-032	1-C5
R506	4700	4704-0472-032	1-C5
R507	22K	4704-0223-032	1-C5
R508	22k	4704-0223-032	1-C4
R509	15K	4704-0153-032	1-C4
R510	2700	4704-0272-032	1-C4
R511	2700, 2%	4704-0272-022	1-B4
R512	3600, 2%	4704-0362-022	1-B4
R513	22K	4704-0223-032	1-C4
R514	12K	4704-0123-032	1-C4
R515	15K	4704-0153-032	1-C4
R516	10K, variable	4751-0103-001	1-B3

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
R517	10K	4704-0103-032	1-C3
R518	47K	4704-0473-032	1-C3
R519	22K	4704-0223-032	1-C3
R520	47K	4704-0473-032	1-C3
R521	Not used		
R522	Not used		
R523	5600	4704-0562-032	1-C4
R524	6800	4704-0682-032	1-C4
R525	22K	4704-0223-032	1-D4
R526	10K	4704-0103-032	1-C4
R527	39	4704-0390-032	1-D4
R528	2200	4704-0222-032	2-D8
R529	10K	4704-0103-032	2-C8
R530	220	4704-0221-032	2-C8
R531	100	4704-0101-032	2-C7
R532	10	4704-0100-032	2-C7
R533	2200	4704-0222-032	2-E3
R534	Not used		
R535	1200	4704-0122-032	2-D6
R536	6800	4704-0682-032	2-D7
R537	39	4704-0390-032	2-D6
R538	10	4704-0100-032	2-D6
R539	56	4704-0560-032	2-D5
R540	10K	4704-0103-032	1-F2
R541	10K	4704-0103-032	2-D5
R542	1	4704-0109-032	1-H2
R543	1200	4704-0122-032	1-F4
R544	2.7	4704-0279-032	1-F3
R545	100, 2W, 5% WW	4707-0101-031	1-F3
R546	2200	4704-0222-032	1-G3
R547	10K	4704-0103-032	1-G3
R548	8200	4704-0822-032	1-G2
R549	10K	4704-0103-032	1-F2
R550	2200	4704-0222-032	1-G2
R551	3.9, 5W, 10%, WW	4707-0399-043	1-H3
R552	10K	4704-0103-032	1-G2
R553	2200	4704-0222-032	1-G2
R554	10K	4704-0103-032	1-F2
R555	68K	4704-0683-032	1-F3
R556	1200	4704-0122-032	1-G3
R557	10K	4704-0103-032	1-G3
R558	Not used		
R559	Not used		
R560	Not used		
R561	10K, variable	4751-0103-001	1-C5
R562	Not used		
R563	470	4704-0471-032	2-D8
R564	10	4704-0100-032	1-G3

3-6 MAIN BOARD, TRANSMITTER (continued)

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
THERMISTOR			
RT501	Thermistor	5300-0000-001	1-F4
CRYSTAL			
Y501	10.240 MHz	2338-3300-501	1-F3

3-7 FREQUENCY SENSITIVE PARTS - "A" MODEL

Only the components listed vary from the "B" model Parts List given in Sections 3-1 through 3-6.

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
C205	Not used		C7
C208	22pF, 50V, 5%	1500-0220-550	C6
C209	22pF, 50V, 5%	1500-0220-550	C5
L201	coil	1800-5149-706	C6
C301	91pF, 50V, 5%	1500-0910-550	B7
C304	100pF, 50V, 5%	1500-0101-505	B7
C326	100pF, 250V, 10%, Mica	1522-0101-007	C3
C332	60pF, 250V, 5%, Mica	1522-0600-006	B3
C333	56pF, 250V, 10%, Mica	1522-0560-007	B2
C338	33pF, 250V, 5%, Mica	1522-0330-006	B2
L309	3T Airwound	1801-3460-900	B2
C414	8.2pF, 50V, 10%	1538-0829-608	2-F7
C416	10pF, 50V, 5%	1538-0100-508	2-F7
C419	6.8pF, 50V, 10%	1538-0689-608	2-G8
C421	10pF, 50V, 5%	1538-0100-508	2-G8
C426	8.2pF, 50V, 10%	1538-0829-608	2-G7
C428	8.2pF, 50V, 10%	1538-0829-608	2-G7
C526	4.7pF, 50V, 10%	1538-0479-608	2-D7
C528	10pF, 50V, 5%	1538-0100-508	2-D7
C529	4.7pF, 50V, 10%	1538-0479-608	2-D7
C534	10pF, 50V, 5%	1538-0100-508	2-D6
C536	8.2pF, 50V, 10%	1538-0829-608	2-D5
C537	27pF, 50V, 5%	1538-0270-508	2-D5
C538	6.8pF	1500-0689-505	2-D5

3-8 FREQUENCY SENSITIVE PARTS - "C" MODEL

Only the components listed vary from the "B" Model Parts List given in Sections 3-1 through 3-6.

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
C205	6.8pF, 500V, 5%	1500-0689-505	C7
C217	10pF, 50V, 10%	1500-0100-650	B6
C301	68pF, 50V, 5%	1524-0680-002	B7
C304	82pF, 50V, 5%	1524-0820-002	B7
C309	56pF, Mica	1522-0560-007	C6
C318	56pF, Mica	1522-0560-007	B5
C332	40pF, Mica	1522-0400-006	B3
C338	20pF, Mica	1522-0200-006	B2
C414	5.6pF, 50V, 10%	1538-0569-608	2-F7
C415	.39pF, 10%	1510-0398-900	1-F7
C416	6.8pF, 50V, 10%	1538-0689-608	2-F7
C419	6.8pF, 50V, 10%	1538-0689-608	2-G8
C426	5.6pF, 50V, 10%	1538-0569-608	2-G7
C427	.33pF, 10%	1510-0338-900	2-G7
C428	5.6pF, 50V, 10%	1538-0569-608	2-G7
L401	coil, red	1800-3152-002	2-G8
L402	coil, red	1800-3152-002	2-G8
C526	2.7pF, 50V, 10%	1538-0270-608	2-D7
C528	5.6pF, 50V, 10%	1538-0569-608	2-D7
C534	5.6pF, 50V, 10%	1538-0569-608	2-D6
C536	8.2pF, 50V, 10%	1538-0829-608	2-D5
C537	6.8pF, 50V, 10%	1538-0689-608	2-D5
*C570	22pF, 50V, 5%	1500-0220-550	2-D5
L504	coil, red	1800-3152-002	2-D6

*Indicates that this part is mounted on the solder side of the PC Board.

3-9 PARTS VARIABLE CHANNEL (ALL MODELS)

REF. DESIG.	DESCRIPTION	PART NUMBER	SCHEM. ZONE
CR406	Zener, 6.8V	4804-0000-042	1-D5
IC401	EAROM	3130-1355-200	1-F4
IC403	Microprocessor	3130-6105-102	1-E6
Q404	Transistor, NPN	4801-0000-016	1-D5
Q405	Transistor, NPN	4801-0000-016	1-D5
R418	Res. 1.2K, 5%, 1/4W	4704-0122-032	1-D5
R419	Res. 1.2K, 5%, 1/4W	4704-0122-032	1-D5
R420	Res. 10K, 5%, 1/4W	4704-0103-032	1-D5
C470	Not used		1-D4

3-11 MECHANICAL PARTS

EXPLD. VIEW REF. NO.	DESCRIPTION	PART NUMBER	QTY USED
C1	.001uF Feedthru cap	1521-5129-800	1
C2,3,4,5	150pF Cer Disc cap	1523-0151-002	4
1	Control Knob	2402-6067-203	2
2	Front Panel - black	1411-7059-810	1
	Front Panel - brown	1411-7059-813	
3	Keyboard	2001-6066-706	1
4	Display Lens	3900-5156-007	1
5	Plastic Washer	2844-1812-774	2
6	Plastic Washer	2844-1315-302	2
7	Screw	2811-3185-600	2
8	Plastic Bushing	2501-3450-100	2
9	Paper Mask Insulator	2514-3308-800	1
10	Ribbon Cable - 9 cond.	6008-3300-006	1
11	Ribbon cable - 14 cond.	6008-3300-003	1
12	Keyboard Light Panel	1411-6065-402	1
13	Light Bulb Assembly	7011-1281-000	1
14	Front Panel Bracket	1400-7060-600	1
15	Screw	2808-0250-030	5
16	Screw	2816-3229-601	1
17	Bottom Shield	2508-6428-501	1
18	Case Bottom - Gray	1411-7053-014	1
	Case Bottom - Beige	1411-7053-009	
19	Case Screw	2809-0312-012	1
20	Case Screw	2816-3298-702	4
21	Screw	2808-0250-034	23
22	Main Chassis	1403-7417-800	1
23	Cable Tie	6005-3457-001	2
24	Mic Connector	2105-0000-023	1
25	Mounting Bolts	2806-0625-028	2
26	Lock Washer	2841-0000-001	2
27	Flat Washer	2840-3191-909	2
28	Plastic Washer	2844-6070-701	2
29	Screw	2807-3298-001	5
30	Spacer	2800-1325-701	2
31	Screw	2803-0312-001	2
32	Socket, 14-pin	2105-3299-202	1
33	Socket, 10-pin	2105-3354-801	1
34	Socket, 9-pin	2105-3299-205	1
35	Cable Clip	6002-3457-101	1
36	Cable Clip	6002-3457-501	2
37	Shield Can	2508-1288-901	6
38	Nut	2852-0440-001	2
39	Screw	2811-3185-600	7
40	Crystal Clip	2830-6073-500	1
41	PA Shield Cover	2508-6445-402	1
42	PA Shield	2508-6445-300	1
43	Screw	2823-0250-042	8
44	Screw	2823-0312-042	2
45	90° connector, 3-pin	2105-3345-502	1

3-11 MECHANICAL PARTS (continued)

EXPLD. VIEW REF. NO.	DESCRIPTION	PART NUMBER	QTY USED
46	Screw	2823-0562-042	1
47	Spacer	2800-3301-104	1
48	Internal Shield	2508-5480-000	1
49	Screw	2823-0375-042	5
50	Spacer	2813-1240-633	4
51	Phono Jack	2101-3451-301	2
52	Phono Plug	2104-3451-401	1
53	Phono Plug, 90°	2104-3457-601	2
54	Connector Body, 3-pin	2109-3339-706	1
55	Connector Pin	2106-3339-801	3
56	VCO Shield	2508-5480-300	1
57	Screw	2823-0500-042	4
58	Connector, 8-pin	2105-3457-302	1
59	Cable Tie	6005-0000-002	10
60	Phono Jack	2101-3451-201	1
61	Connector, 8-pin	2105-3457-402	1
62	Spacer	2813-1240-635	4
63	Front PA Bracket	1400-6447-200	1
64	Heatsink	5400-6445-200	1
65	Case Top - Gray	1411-7053-014	1
	Case Top - Beige	1411-7053-009	
66	Antenna Connector	2105-0000-020	1
67	Speaker Jack	2101-3430-303	1
68	Solder Lug	2101-0000-004	1
69	Connector Pin	2107-3244-101	2
70	Connector Body	2109-5120-403	1
71	Rear PA Bracket	1400-6445-500	1
72	Washer	2840-3191-913	1

S E C T I O N 4 - S E R V I C E B U L L E T I N S

Add to this section any Service Bulletins that are issued concerning changes to this manual.

Regency Land Mobile, Inc.

CUSTOMER QUESTIONNAIRE

In order for Regency Land Mobile, Inc. to provide you with accurate and informative manuals, please answer the following questions:

(Tear Along Perforation)

IAGRAMS AND ILLUSTRATIONS

. ☐ Are accurate and easy to follow
. ☐ Contain minor errors
. ☐ Contain major errors
. ☐ Are difficult to follow

you have checked any box except 1, please tell us what diagrams, or ortions thereof, were at fault, or enter other comments.

EXT

. ☐ Easy to follow - helps to service equipment
. ☐ Would like more information on

. ☐ Some instruction sections are too long or superfluous, such as

4. Other comments

PARTS LIST

1. ☐ Are complete and accurate
2. ☐ Would like more information as follows

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MODEL #
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MANUAL # 0300-
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SUBJECT: ERRATA to RH600/WH6016 Service Manual.

DISTRIBUTION INSTRUCTIONS: To all Manual Distribution and Storage Locations. One (each) ERRATA is to be inserted in each RH600/WH6016 Service Manual prior to distribution.

USER INSTRUCTIONS: *Make all corrections and/or additions listed below under ERRATA.

* Indicates Action To Be Taken.

\# Indicates New or Revised Item.

ERRATA (effective change date: 8/27/85)

Model Affected	Manual Identifying No.	Manual Date	Page No.(s) Affected
RH600/WH6016	0300-4399-000	8/85	58,90.

Page 58.
*The "PARTS PLACEMENT, BOTTOM SIDE" drawing shows two (2) capacitors labeled C567. The C567 located closest to the top of the page should be labeled C467.

Page 90, EXPLD. VIEW REF. NO. 65, Case Top - Gray.
*Part Number is listed as 1411-7053-014. Change to read 1411-7417-901.

Page 90, EXPLD. VIEW REF. NO. 65, Case Top - Beige.
*Part Number is listed as 1411-7053-009. Change to read 1411-5178-402.

//////////////////////End of Errata//////////////////////////////

REGENCY LAND MOBILE, INC.
4505 WEST HACIENDA AVENUE
LAS VEGAS, NEVADA 89118

SUBJECT: Manual change to correct artwork error.

INSTRUCTIONS: *Remove page 61-62 from manual and insert corrected page 61-62.

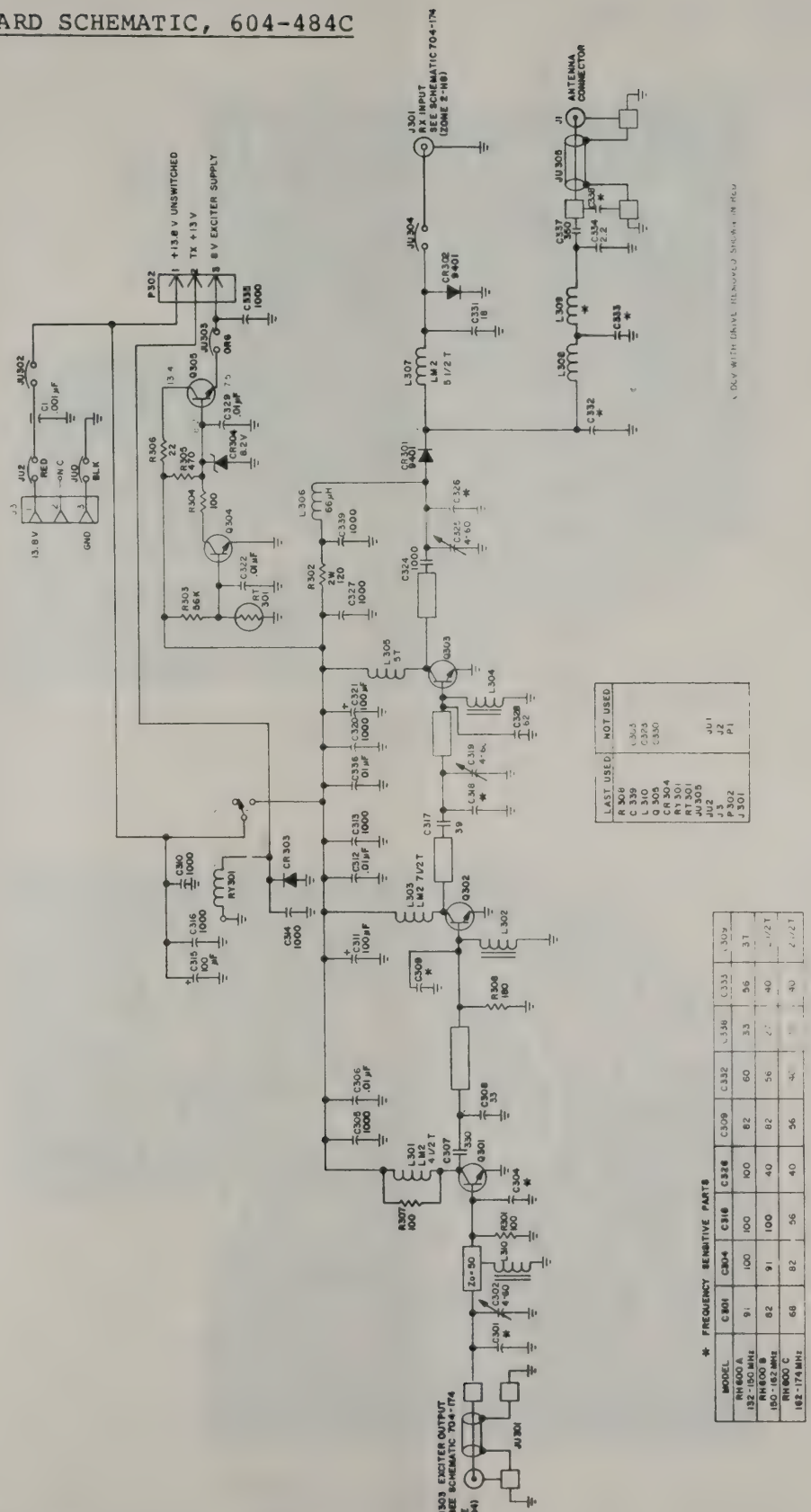
* Indicates Action To Be Taken.

\# Indicates New or Revised Item.

CHANGE (effective change date: 7/25/85)

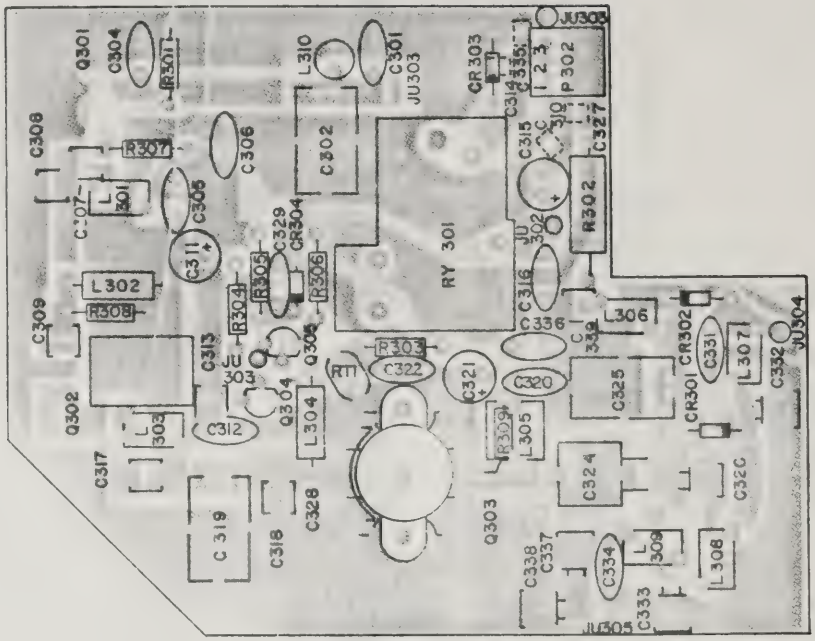
Model Affected	Manual Identifying No.	Manual Date	Page No. Affected
RH600/WH6016	0300-4399-000	4/85, 5/85	#62

PA BOARD SCHEMATIC, 604-484C



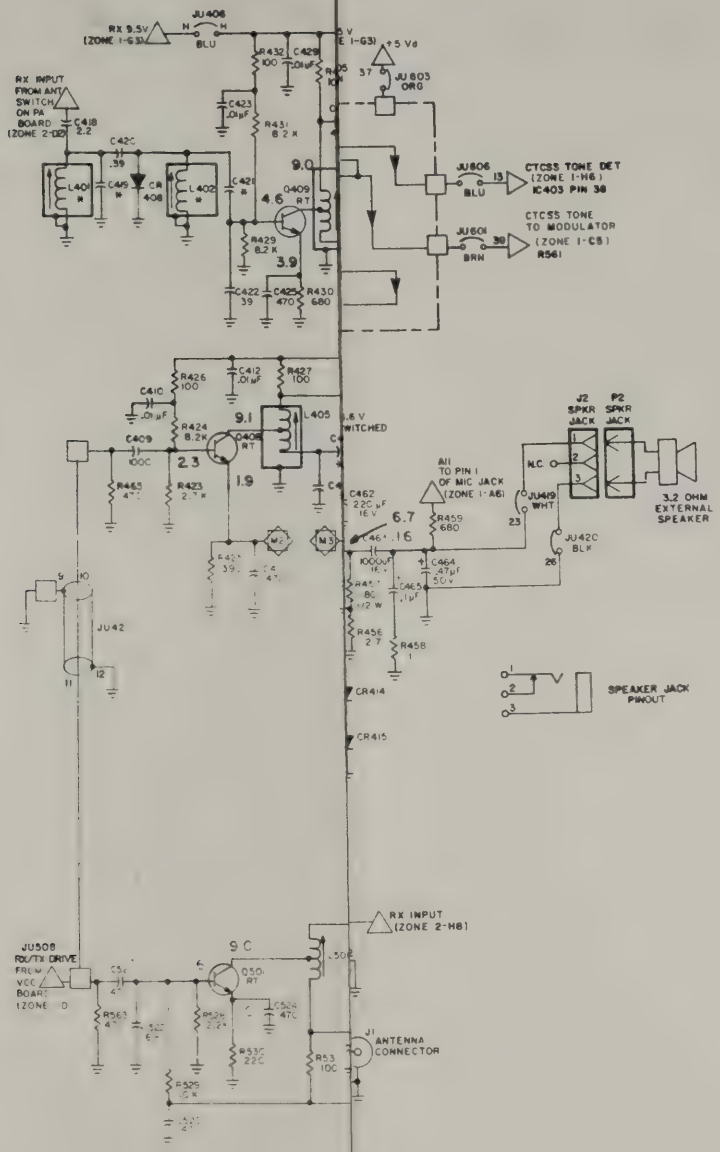
* FREQUENCY SENSITIVE PARTS

MODEL	C301	C304	C316	C328	C329	C332	C346	C333	L309
RH600A 132-150 MHz	91	100	100	100	82	60	33	56	3 T
RH600 B 150-162 MHz	82	91	100	40	82	56	22	40	4 1/2 T
RH600 C 162-174 MHz	68	82	56	40	56	40	18	40	4 1/2 T



PARTS PLACEMENT

PARTS OVERLAY

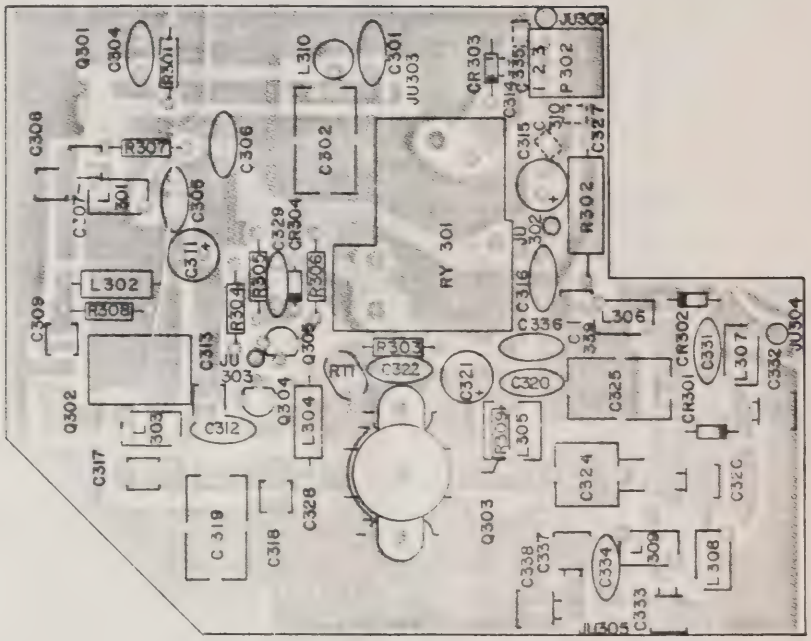


* MODEL SENSITIVE (- MEANS C

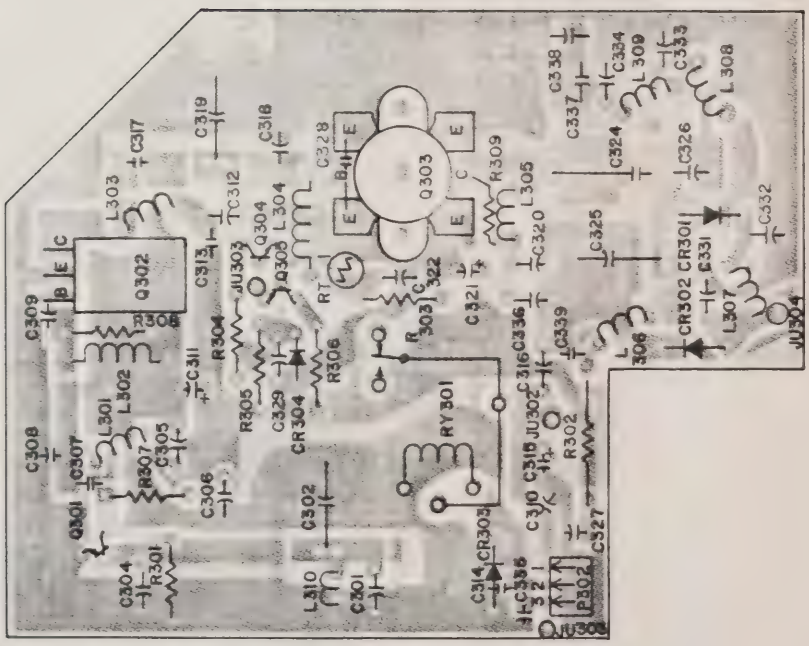
			C414	C4
RH-800/8H-SCHS A (32-150 MHz)			8.2 pF	.4
RH-800/8H-SCHS B (150-162 MHz)			6.8 pF	.4
RH-800/8H-SCHS C (162-175 MHz)			5.6 pF	.3

VOLTAGES IN RED
VOLTAGES IN BLUE
/UNSQ

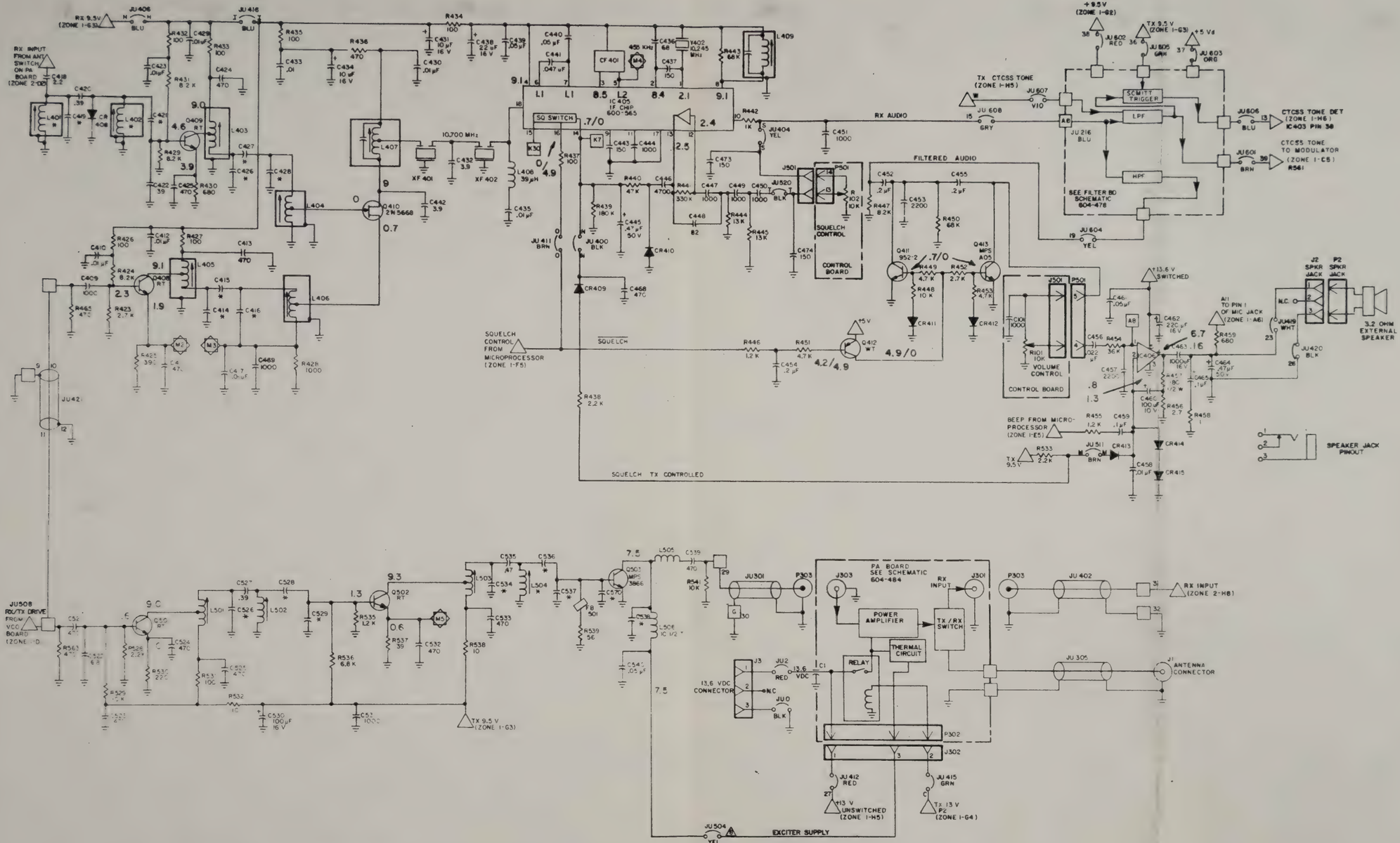
MAIN SCHEMATIC
704-174B
SHEET 2



PARTS PLACEMENT



PARTS OVERLAY

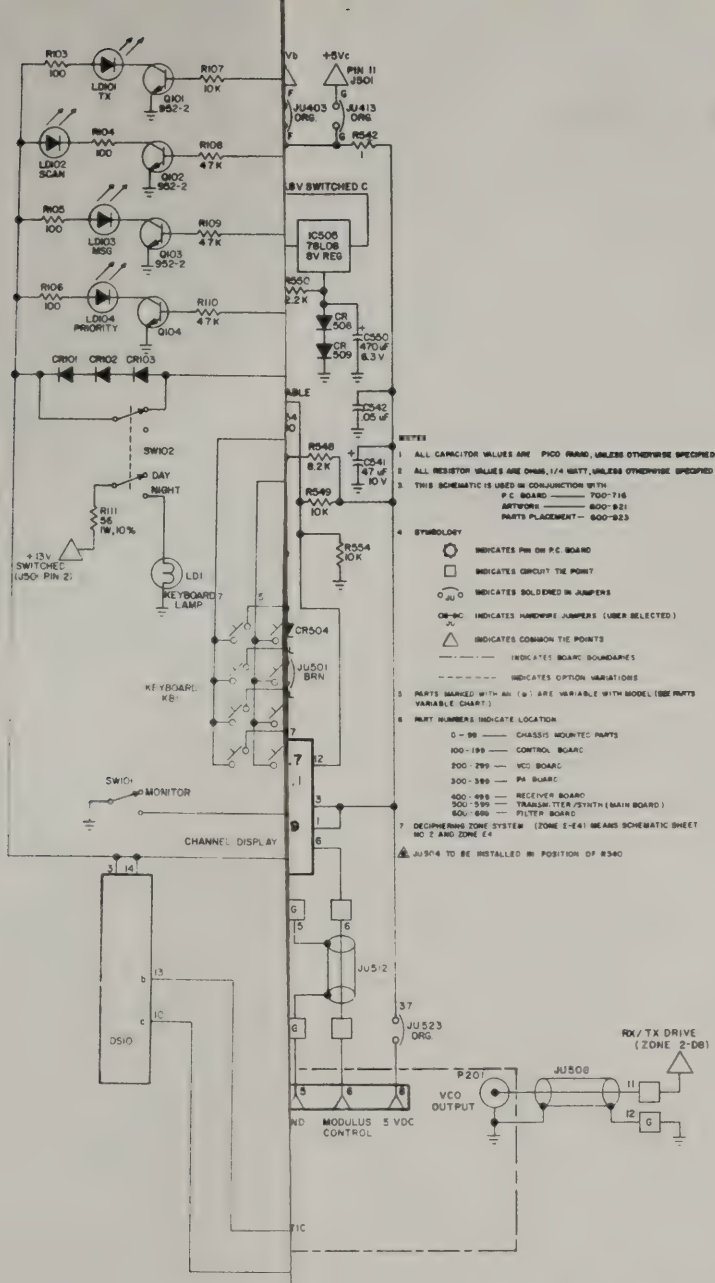


* MODEL SENSITIVE (- MEANS OMIT PART ; JU MEANS REPLACE WITH JUMPER)

				C414	C415	C416	C419	C421	C426	C427	C428				C526	C528	C529	C534	C536	C537	C538	C570	L401	L402	L504
RH-600/SH-600 A (132-150 MHz)				8.2 pF	.47 pF	10 pF	6.8 pF	10 pF	8.2 pF	.39 pF	8.2 pF				4.7 pF	10 pF	4.7 pF	10 pF	8.2 pF	27 pF	6.8 pF	—	-20	-20	-20
RH-600/SH-600 B (150-162 MHz)				6.8 pF	.47 pF	8.2 pF	5.6 pF	8.2 pF	6.8 pF	.39 pF	6.8 pF				3.3 pF	6.8 pF	3.9 pF	6.8 pF	6.8 pF	22 pF	3.9 pF	—	-20	-20	-20
RH-600/SH-600 C (162-175 MHz)				5.6 pF	.39 pF	6.8 pF	6.8 pF	8.2 pF	5.6 pF	.33 pF	5.6 pF				2.7 pF	5.6 pF	3.9 pF	5.6 pF	6.8 pF	6.8 pF	3.9 pF	22 pF	-2	-2	-2

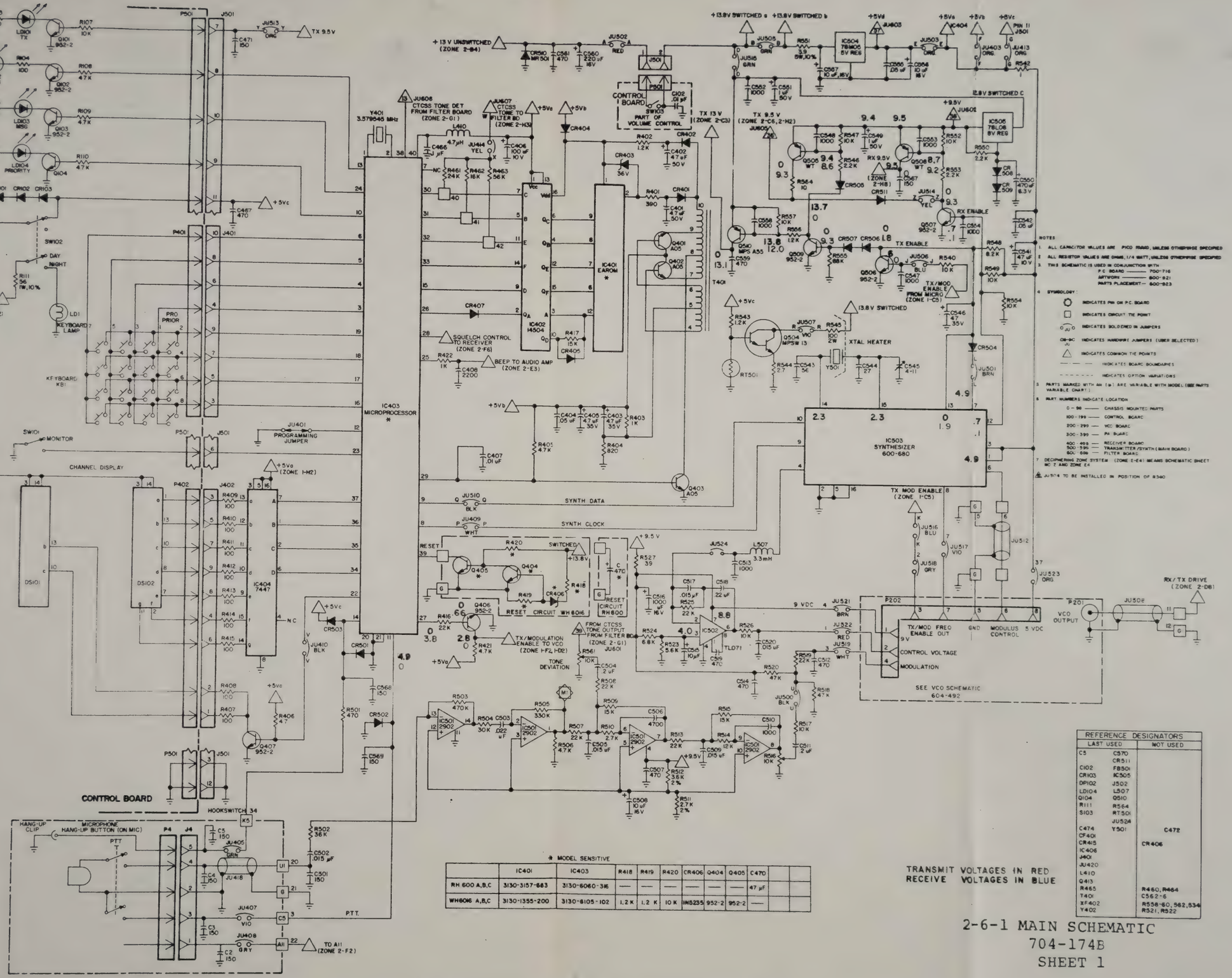
TRANSMIT VOLTAGES IN RED
RECEIVE VOLTAGES IN BLUE
SQ/UNSQ

2-6-2 MAIN SCHEMATIC
704-174B
SHEET 2



REFERENCE DESIGNATORS		
LAST USED		NOT USED
C5	C570	
	CR511	
C102	F850	
CR103	IC505	
DP102	J502	
LD104	L507	
Q104	Q510	
R111	R564	
S103	RT501	
	JU524	
C474	Y501	C472
CF401		
CR415		CR406
IC406		
J401		
JU420		
L410		
Q413		
R465		R460, R464
T401		C562-6
XF402		R558-60, 562, 534
Y402		R521, R522

6-1 MAIN SCHEMATIC
704-174B
SHEET 1



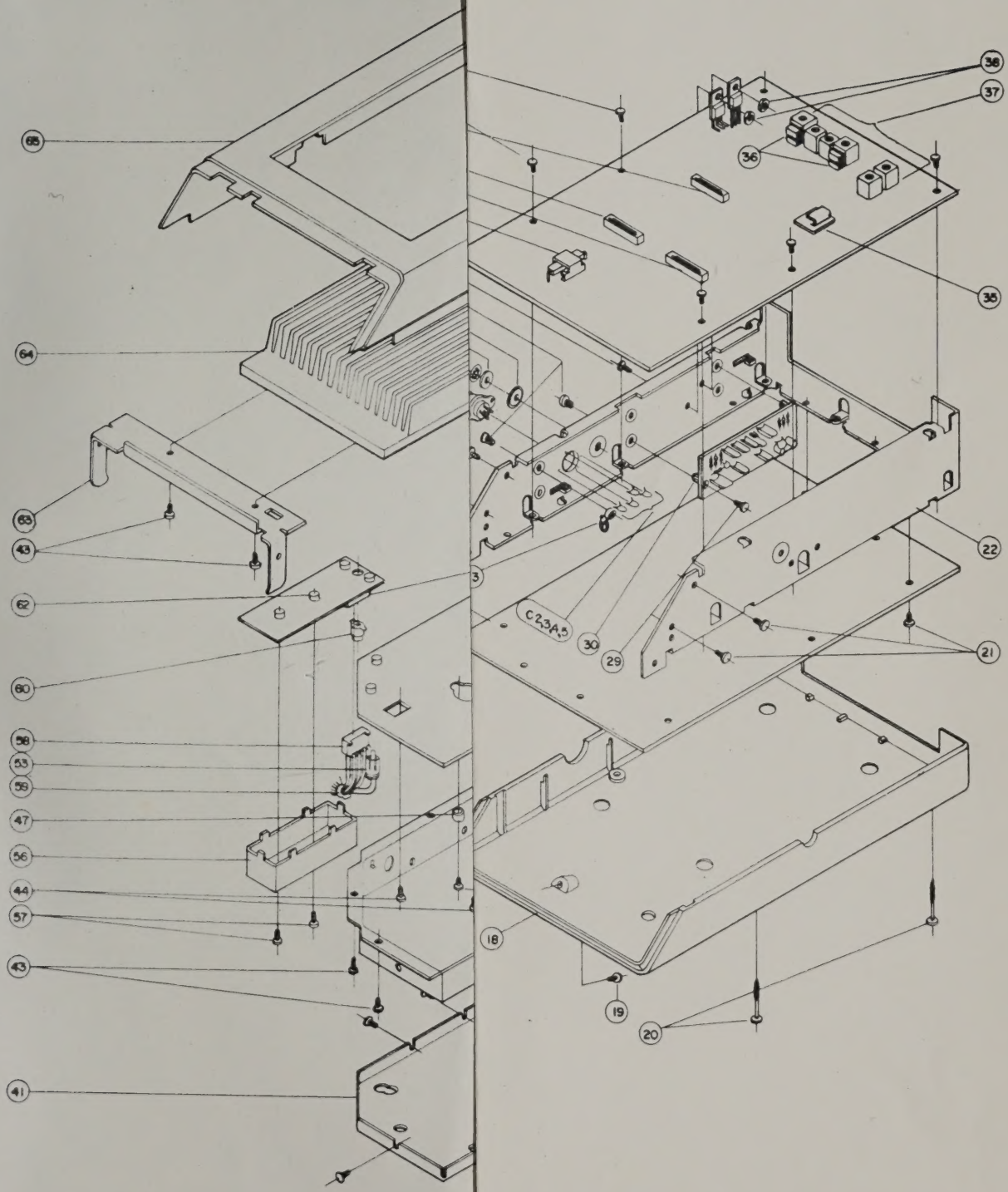
	IC401	IC403	R418	R419	R420	CR406	Q404	Q405	C470		
RH 600 A,B,C	3130-3157-683	3130-6060-316	—	—	—	—	—	—	47 µF		
WH6046 A,B,C	3130-1355-200	3130-6105-102	1.2 K	1.2 K	10 K	IN5235	952-2	952-2	—		

REFERENCE DESIGNATORS		
LAST USED		NOT USED
C5	C570	
	CR511	
C102	FB501	
CR103	IC505	
DP102	J502	
LD104	L507	
Q104	Q510	
R111	R564	
S103	RT501	
	JU524	
C474	Y501	C472
CF401		
CR415		CR406
IC406		
J401		
JU420		
L410		
Q413		
R465		R460, R464
T401		C562-6
XF402		R558-60, 562, 534
Y402		R521, R522

2-6-1 MAIN SCHEMATIC
704-174B
SHEET 1

2-6 Diagrams, Voltage Data, and Schematics

2-6-1 Main Schematic (Sheet 1)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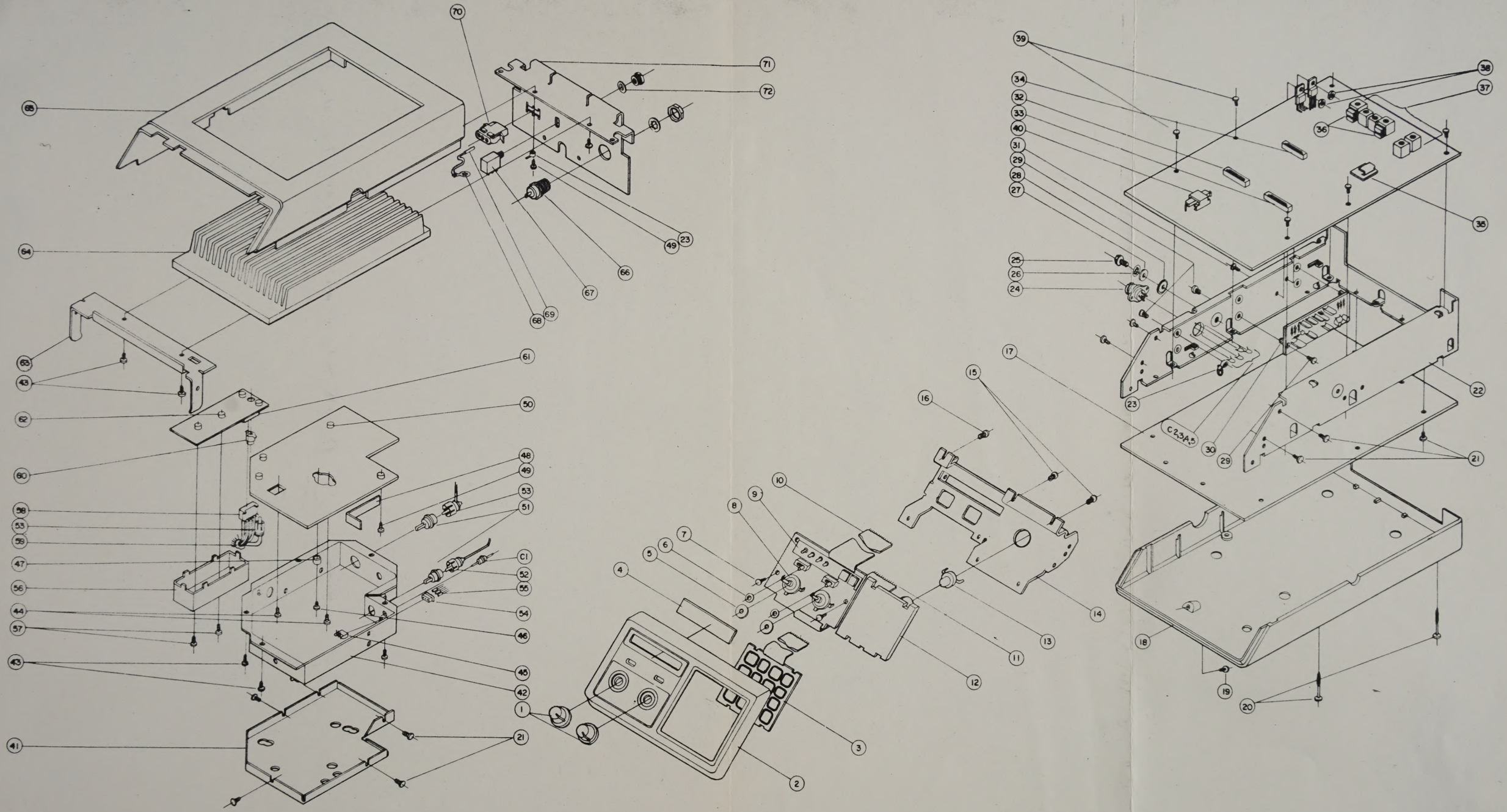
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